MASTER THESIS

Market Creation for Drip Irrigation at the Base of the Pyramid

A South-South Transfer from India to Kyrgyzstan

University of St. Gallen

Master of Arts in International Affairs and Governance (MIA)

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ABSTRACT

Presently worldwide over one billion people live on less than $1.25 a day. These people constituting the global Base of the (socio-economic) Pyramid (BoP) live mainly in developing countries, where state institutions usually are weak and ineffective and in consequence mainly rely on self-supply, subsistence agriculture and private markets to provide for their livelihoods. Markets at the BoP, however, often neither work in favor of the poor nor meet their needs appropriately as they participate in them as consumers or producers.

Since 60 years developed and developing countries, international and non-governmental organizations have been trying to fight the deplorable conditions billions of human beings are living in, yet achievements are mediocre and ambivalent as to actually lifting people out of extreme poverty. In the modern aid system only recently new market-based approaches for development have been introduced with the rationale to create and/or change markets to work more effectively and sustainably in favor of the poor, improve their livelihoods and consequently reduce poverty.

This master thesis presents the theoretical rationales and practical implications of a market creation approach for low-cost drip irrigation technology at the BoP in a general manner as well as specifically for the case of smallholding farmers in Kyrgyzstan. Based on past and present scientific literature and empirical observations made in India and Kyrgyzstan, the thesis argues that by providing poor people with productivity enhancing products and services at market prices, it is possible to create a win-win situation both for private businesses and the poor. For a market creation approach it is, however, not sufficient to purely rely on private actors, but public institutions need to step in with financial support at least at initial stages. In addition, due to the high complexity of market systems, various forms of public-private cooperation are necessary in order that a market can become beneficial for the poor in a sustainable manner.

The approach outlined here thinks of the poor as capable entrepreneurs and value conscious consumers that need to be actively involved in markets and commercial activity in order to be lifted out of poverty. Products or services for the BoP in consequence have to be designed according to real needs and with an adequate cost-benefit ratio. And they must be marketed by effective promotional strategies that allow efficiently using the limited public funds of a market creation program. Eventually sustainably implementing such programs at the BoP and thus successfully alleviating poverty can serve as an exit strategy for development assistance and allows bypassing its most predominant controversies.

FOREWORD

My motivation for investigating market-based approaches for development at the BoP in my master thesis is partly due to a practical project in Development Cooperation I attended at the University of St.Gallen in spring-summer 2009 taught by Ph.D. Urs Heierli. Also personal experiences in various developing countries made me aware of the deplorable situation people in extreme poverty are living in. The issue kept nagging me: What are we doing about the poorest people in the world? Needless to say this is not a new question, yet it became clear to me that working on solutions to the problems of those at the BoP should be an integral part of my future intellectual and professional journey. By fluke of destiny being a Swiss citizen with a happy childhood in a stable family and an academic education, I am aware of my very privileged situation and I cannot ignore the difficulties of others that have less luck in their lives.

For the writing of this thesis I am very grateful for the support of Urs Heierli, who enabled me to go on two internships in India and Kyrgyzstan to study market-based development approaches at the BoP and gave me insightful ideas. I would also like to thank the people that accompanied and supported me in India and Kyrgyzstan, namely Pramodini Joshi of IDE in India and Lydia Plüss of Helvetas in Kyrgyzstan. Moreover I am thankful for the revealing and interesting conversations I had with various people, be it regarding the content of this thesis, the structure and the form or simply allowing me to work in an efficient manner. My thesis could not have been accomplished without them.

KEY WORDS

Bottom of the Pyramid (BoP); Market Creation at the BoP; Marketing at the BoP; Low-cost Drip Irrigation, Kyrgyzstan, India

A) CONTENT

B) FIGURES

C) TABLES

D) ABBREVIATIONS

- AESP: Agricultural Extension Service Provider
- ADB: Asian Development Bank
- BoP: Base/Bottom of the Pyramid
- BRIC: Brazil, Russia, India, China
- DAC: Development Assistance Committee
- DEA: Federal Department of Economic Affairs
- DIS: Drip Irrigation System(s)
- EBRD: European Bank for Reconstruction and Development
- EC: European Commission
- FFP: The Fund for Peace
- GDP: Gross Domestic Product
- GEWP: Global Easy Water Products Ltd.
- GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit
- GNI: Gross National Income
- GNP: Gross National Product

- GTZ: Deutsche Gesellschaft für Technische Zusammenarbeit
- HDI: Human Development Index
- IADB: Inter-American Development Bank
- IDE: International Development Enterprises
- IDEI: International Development Enterprises India
- IFAD: International Fund for Agricultural Development
- IFC: International Finance Corporation
- IMF: International Monetary Fond
- MDG: Millennium Development Goals
- M4P: Making Markets Work for the Poor
- NGO: Non-Governmental Organization
- ODA: Official Development Assistance
- OECD: Organization for Economic Cooperation and Development
- OPEC: Organization of Petroleum Exporting Countries
- PPP: Purchasing Power Parity
- PRB: Population Reference Bureau
- R&D: Research and Development
- SDC: Swiss Agency for Development and Cooperation
- SEP: Efficient Use of Water Project of Helvetas
- SME: Small and Medium Enterprise
- SSA: Sub-Saharan Africa
- UK: United Kingdom
- UN: United Nations
- UNDP: United Nations Development Program
- WRI: World Resource Institute
- ZOKI: Public Foundation "*Training, Advisory and Innovation Centre*"

I INTRODUCTION

"We will spare no effort to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty […] We resolve further to halve, by the year 2015, the proportion of the world's people whose income is less than one dollar a day."

United Nations Millennium Declaration (2000)

1 Problem Definition: How to Lift the Poor out of Poverty?

Presently worldwide over one billion people live on less than $1.25 a day. Living in such extreme poverty means to lack the fulfillment of basic human needs such as clean water, nutrition, health care, education, clothing and shelter. Often poor people are simply not able to pay for these needs. Consequently, compared to people with higher income, the poor are more often sick and undernourished, child mortality is high and life expectancy low. Moreover extreme poverty is almost exclusively found in developing countries, where state institutions are often weak and ineffective.

Since the 1950s rich countries, international organizations and non-governmental organizations (NGOs) came up with different approaches regarding development cooperation and poverty reduction measures for poor people in developing countries. The so called aid system exists for more than 60 years. The measures proposed vary widely, yet the outcome of 60 years efforts is only mediocre. William Easterly (2006, p.45) for instance writes: "*The typical country in Africa received more than 15 percent of its income from foreign donors in the 1990s, [but that] surge in aid was not successful in reversing or halting the slide in growth of income per capita toward zero.*" Currently there are development experts - especially within the framework of the Millennium Development Goals (MDGs) - which argue that rich countries have both the technology that poor countries need to prosper and the wealth to provide it to them. However the willingness and determination of the rich is deficient in order to fulfill this promise (Sachs 2005, p.11). Contrariwise there are authors like George Ayittey (2004), William Easterly (2006) or Dambisa Moyo (2009) arguing that not only aid has failed to make poor countries more prosperous, but also that the aid system continues to do the same things again and again despite the evidence that they do not work (Glenn and Duggan 2009, preface).

Yet, as this thesis shows, there is a happy medium between these two contradicting views. New and creative approaches to development do not need to be invented, but are already around and only wait to be put into practice. To make the aid systems more effective and especially learn from what private initiative can achieve, since the end of the 20th century new market-based approaches for development have been introduced. Business-oriented incentives for growth, innovation and profits are coordinated with efforts to create a more inclusive capitalism for the poor in developing countries. The goal is to convert poverty into an opportunity for all concerned (Prahalad 2004, p.XIII).

Poor people and their needs are, however, very diverse. They live in different locations, urban

and rural, they have different values and cultures, and they have different livelihoods and expectations. Nevertheless to cope with daily routine and since they live mostly in places and regions with limited state service provision, poor people often rely almost exclusively on private markets to provide for their needs. Such markets in which the poor participate either as consumers or producers are often informal, uncompetitive and do not meet their needs effectively. In this regard the goal of market-based development approaches is to create and/or change markets to work more effectively and sustainably for the poor, thus improve their livelihoods and consequently reduce poverty. In the present aid system, however, market-based approaches are still recent and haven't had many chances so far to prove their effectiveness.

Authors like Prahalad (2002, 2004), Hart (2002, 2007), Hammond (2002, 2007) and Karnani (2007) were pioneers in the emergence of a business perspective for poverty alleviation. They defined poor people as living at the Bottom of the (socio-economic) Pyramid (BoP) and at the same time representing a huge untapped potential for consumption and production opportunities for all kinds of entrepreneurial activities. According to these authors, by providing the poor with affordable productivity enhancing products and goods, it is possible to create a win-win situation both for private businesses and the poor. These approaches thus think of the people at the BoP as capable entrepreneurs and value conscious consumers that know themselves what is good or bad for them.

Yet to successfully implement market creation programs at the BoP it is not sufficient to purely rely on the private business sector. Markets and respective market systems - consisting of not only the core function of supply and demand, but also of formal rules and informal norms as well as supporting functions – are very complex. In consequence neither the private nor the public sector alone will be able to intervene successfully in favor of the poor. Contrariwise close cooperation between both public and private institutions is necessary in order to successfully intervene in or create a market. As Prahalad (2004, p.65) suggests the private sector and social actors, although often with different traditions and motivations should "*start to act together and create wealth for the poor in a symbiotic relationship*".

This master thesis shows that market-based development approaches at the BoP actually work and may eventually serve as an exit strategy for the present controversial aid system. Therefore the theoretical part deals with the general rationales of these promising approaches, necessary conditions and guidelines as well as with various shortcomings and contradictions. The goal of the practical part is to put the outlined theory into practice in the case of Central Asian Kyrgyzstan regarding low-cost drip irrigation technology for smallholding farmers.

2 Focus and Method

The market creation approach at the BoP presented theoretically in this master thesis aims to

introduce products that are helpful for poverty alleviation in developing countries. The practical case study of the second part focuses specifically on the creation of a market for low-cost drip irrigation technology for smallholding farmers in Kyrgyzstan.

The Theory part focuses on the following questions:

- *Why is it necessary to use market- based development approaches in the case of developing countries?*
- *How do market-based development approaches differentiate from traditional development approaches?*
- *Why and how does the creation of a market for a specific good or service has a high poverty alleviation impact for people living at the BoP?*

The goal is to theoretically present market creation and marketing strategies at the BoP researching the actual scientific literature as well as theoretical conclusions drawn from two internships in India and Kyrgyzstan for the NGOs International Development Enterprises (IDE) and Helvetas. The focus will be on why it is necessary to use business approaches as new strategies in the aid system for introducing a product such as drip technology, on necessary conditions regarding effective marketing strategies, on the role of facilitating agencies and on how a market and a respective supply chain can be made sustainable. Consequently, the topic of this study is not export marketing or Fair Trade which can also be associated to the subject of market creation. It will be argued that market-based development approaches are important because they can actually bring sustainable results regarding poverty alleviation in the longer term and can present an exit strategy for the current international aid system.

In the Practice part the following question guides the thesis:

- *How can a sustainable market for drip irrigation technology be created in Kyrgyzstan, also with regard to empirical experiences from India?*

The second part, based on a report elaborated during an internship in Kyrgyzstan in spring 2011, thus transfers market creation know-how and knowledge from India to Kyrgyzstan and tries to apply and test the theoretical rationales of the first part in the specific case of Kyrgyzstan.

Methodologically this second part is about a theory-confirming Kyrgyz case study, where Indian made empirical experiences as well as the actual scientific literature are an integral part. The methodology applied therefore does not aim at generating general scientific truths and generalizations by testing hypothesis or theories which are then applicable to any country, but studies the specific Kyrgyz context and tries to apply theoretical lessons, outlined in the first part (Moses and Knutsen 2007, p.133).

The empirical analysis will further show how the theoretical rationales of the first part can be improved and which assumptions need to be put into perspective. The objective of the internship in

Kyrgyzstan was to develop a market concept at all levels - from producer to the wholesaler and retailer to the farmer - for the creation of a sustainable supply chain for affordable drip irrigation technology. The main task was the collection of data and identification of partners at each level through meetings, interviews, fieldwork and background research. Interview guidelines have been developed which can be found in Appendix I *"Market Concept for Low-Cost Drip Irrigation Systems in Kyrgyzstan"*. Over a period of three months around 40 interviews have been carried out with various stakeholders in the supply and value chain according to pre-defined objectives and the results are presented in the practical part. The complete results can be found in the report in Appendix I.

It is argued that the creation of a market for low-cost drip irrigation systems in Kyrgyzstan has a positive impact on the livelihoods of smallholding farmers in Kyrgyzstan, since it does improve their productivity and income earning potential in the long term in a sustainable way.

3 Structure

The thesis is divided into four main parts, Introduction, Theory, Practice and Conclusion. After having introduced what this thesis is about and having outlined its methodology, the introductory part closes with the present Chapter indicating the overall structure of the thesis.

Next in the Theory part Chapter One first defines the multidimensional nature of poverty and briefly presents the concepts of absolute and relative poverty. Actual poverty numbers are quantified, poverty trends on a global level outlined as well as the concept of the socio-economic Bottom of the Pyramid (BoP) is introduced.

Chapter Two is about the importance of economic growth in general for poverty reduction. It also raises attention to specific conditions in order that the poor actually can benefit from aggregate economic growth, i.e. presents the concept of pro-poor growth that strongly depends on local governance and on various forms of freedom and liberties. The chapter closes by explaining the importance of markets for the daily livelihoods of the poor and why it is important that the poor can actively participate in them in their favor.

In Chapter Three the past and present of development assistance is outlined. Official Development Assistance (ODA) is defined and quantified as well as put into perspective as to the amounts and effects of remittances and private grants that yearly flow from developed to developing countries. Next, the historical background of the present modern aid system is portrayed in order to briefly present various rationales of different development strategies and to contextualize present market-based approaches in the historical context. Then the main issue in modern development aid is addressed, that is its effectiveness to actually alleviate poverty. Central planning as well as conditionality, tied aid and incoherencies with other foreign policy goals of donor countries will be revealed as predominant issues and controversies and at the same time will serve as main rationales

for why new market based approaches for development are necessary and deserve to be put into practice.

Eventually Chapter Four presents market creation approaches at the BoP as a new strategy in the modern aid system. Scientific literature as well as empiric information gathered during two internships regarding market creation at the BoP will be reviewed and analyzed in a critical manner, especially as to leaving this approach solely to the private sector. It will be shown that markets and respective market systems are of high complexity, consisting of not only a core of demand and supply, but also of a context of formal rules, informal norms and of supporting functions, which are all necessary in order for a market to function sustainably. Interventions into a specific market and market creation programs in general therefore need to be implemented in cooperation between public and private institutions. Next sustainability concerns of market creation interventions are assessed and Chapter Four closes with presenting conditions as well as necessary characteristics for a facilitating agency that wants to implement market-based development approaches.

Chapter Five addresses the issue of how to market and promote a new product in developing countries and specifically to farmers belonging to the BoP. Selected concepts of marketing strategy will be explained, that is the Product Cycle Curve, Market Segmentation and Product Marketing (Product, Price, Place, Promotion). The goal is to first understand how a market creation program develops as to necessary investments, sales, profits and stakeholders joining the market and second to develop strategies to quickly generate demand and thus financial benefits for all stakeholders involved. Chapter Five closes with some considerations regarding the financing of a marketing campaign and how to decide at what moment of a market creation process supporting funds of a facilitating agency can and must be ceased.

Chapter Six quickly summarizes the findings of the theoretical part and thus prepares the ground for the theory-confirming practical part that puts the outlined rationales into effect in the case of Kyrgyzstan for affordable drip irrigation for smallholding farmers.

In the Practice part the context of Kyrgyzstan will be closely looked at based. Chapter One first outlines the socio-economic context of Kyrgyzstan and then identifies drip irrigation as a specific market constraint for smallholding farmers in the country. The advantages of drip technology in general will be presented as well as an affordable version of it that offers the potential to make smallholding Kyrgyz farmers more productive. This Chapter closes by an analysis of the profitability of low-cost drip irrigation technology at farm level in Kyrgyzstan.

Chapter Two of the practical part addresses the actual creation of a market in Kyrgyzstan and possibly also other Central Asian countries. Three main challenges are identified that have to be successfully overcome, that is (1) the creation of a sustainable and reliable supply chain, (2) the spread of knowledge about and promotion of drip technology and (3) the opportunities for local or Chinese

production and procuring. The following sub-chapters will then address these issues. The findings about the potential and necessary conditions for local or Chinese production or procuring of affordable drip technology are presented; next organizational and profitability concerns at wholesale as well as retail level are assessed in order to be able to create a sustainable supply chain and eventually Chapter Two closes by analyzing risks as well as opportunities of how to promote and with what partners to spread knowledge about drip technology in the country.

The practical part of this thesis closes in Chapter Three with a general outlook for the short and mid-term as to the potential to create a market in Kyrgyzstan as well as other Central Asian countries, with Tajikistan offering the highest potential in the short term.

The thesis is finalized by a Conclusion, where the main results and findings of this study will be briefly presented and summarized. With certain restrictions the aim is to show that market creation approaches at the BoP can actually work to lift the poor out of a life in destitution and may serve as an exit strategy for the current controversial aid system.

II THEORY

"New and creative approaches are needed to convert poverty into an opportunity for all concerned. That is the challenge."

C. K. Prahalad (2004)

1 Conceptualization of Poverty

Chapter One presents theoretical concepts of poverty. First absolute and relative poverty indices are defined and poverty levels and numbers on a global level as to World Bank figures are quantified. Next the presentation of a more multidimensional approach to poverty including economic, civil and political liberties puts the outlined concepts and numbers into perspective. Eventually the introduction of the concept of the Bottom of the Pyramid (BoP) closes Chapter One; the target population for market-based development approaches, respective income thresholds and the dimension and scale of the BoP are thus defined. The reader should get a profound general view of what poverty means and which concepts are presently used in scientific literature.

1.1 Absolute versus Relative Poverty

Absolute poverty is difficult to define, but generally refers to the lack of fulfillment of basic human needs, such as clean water, nutrition, health care, education, clothing and shelter, because of the inability to access or afford them (Encarta 2009, online). Relative poverty in contrast is the condition of having fewer resources or less income than others within a society or country, or compared to worldwide averages. Many countries in addition define a (relative) national poverty line, a poverty line deemed appropriate for a country by its authorities.[1] Relative national poverty levels are especially useful to analyze economic inequalities within a country. However by using national poverty lines in order to assess global poverty, the resulting aggregate poverty measure would not compare people in different countries at the same level as for instance real consumption (Ravallion et al. 2009, p.164).

Naturally poverty cannot be expressed in mere numbers and does not only relate to lack of income, but in order to compare countries, and make economic, social and political analyses, absolute and relative poverty lines and measures are important tools. An absolute poverty line to compare countries is often defined at a specific daily income level per capita in purchasing power parity (PPP[2]). In 2008 the World Bank defined an international absolute poverty line of $1.25 a day at 2005 PPP US-Dollars which counts at the same time as threshold for defining extreme poverty. Some economists

1 To find out more about poverty lines, relative and absolute, see Haughton, Khandker (2009) or World Bank, (2010, p.93)
2 Purchasing power parity (PPP) is a measure that equates the price of a basket of identically traded goods and services across countries, providing a standardized comparison of real prices (London 2007, p.8).

also consider people with an income below $2 a day to live in extreme poverty, mainly since "*a marked economic gradient emerges only when consumption per person is above about $2.00 a day*" (Ravallion et al. 2009, p.163, p.180). This thesis refers to the World Bank international poverty lines when referring to absolute and extreme poverty.

1.2 Quantification and Trends of Poverty on a Global Scale

Extreme poverty is a phenomenon almost exclusively found in developing countries[3]. At the Millennium Summit of the United Nations (UN) in New York in 2000 all 192 member states, signing and ratifying the United Nations Millennium Declaration agreed to achieve eight Millennium Development Goals (MDGs) by 2015. Eradicate extreme poverty and hunger is Goal One and by 2015 wants at a global level to halve the number of people living in extreme poverty - below $1.25 a day - compared to 1990 (UN 2011, online).

Despite the global financial and economic crises poverty rates in developing countries continue to fall. Rapid economic growth in East Asia and Pacific and falling poverty rates in South Asia, the two regions with the most people living on less than $1.25 a day, account mainly for this achievement (World Bank 2010, p.4).

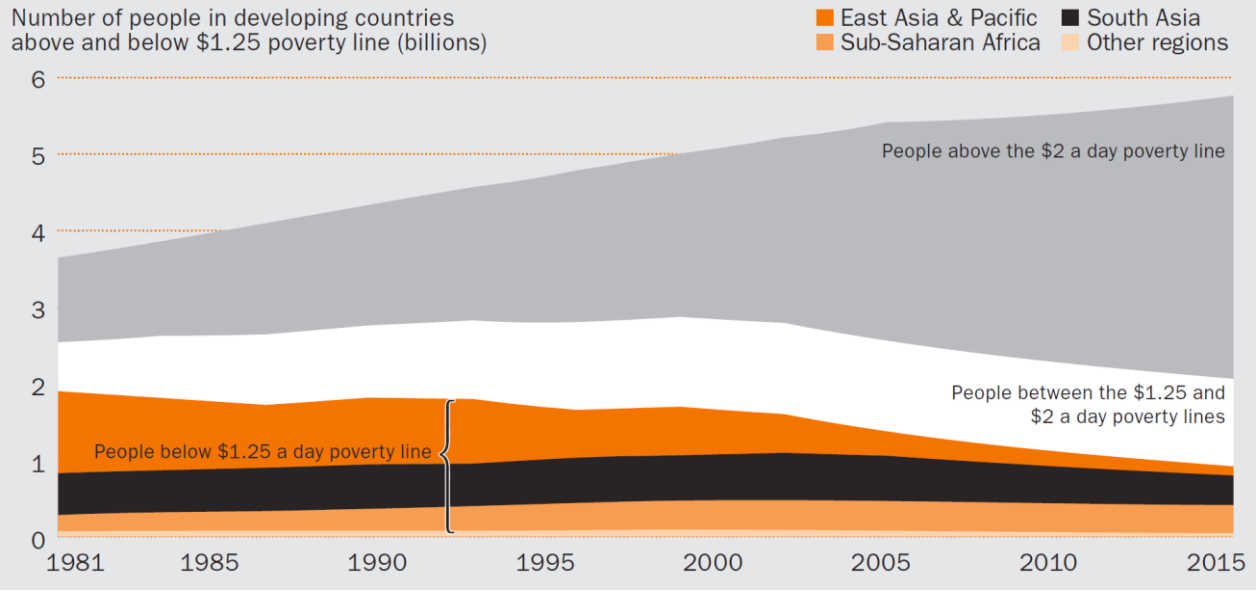

Figure 1: People Living in Extreme Poverty in Developing Countries (adopted from World Bank 2010, p.5)

Figure 1 adopted from World Bank (2010, p.5) summarizes historical and current data as well as trends about the number of people living in extreme poverty. The population increase up to 5.8 billion by 2015 is due to the high population growth rates in developing countries. In 2005 an

[3]Every country and its economy is classified as low income, middle income or high income and the first two than subsumed under the notion developing economies/countries and the latter under developed economies/countries. With reference to the 2010 World Bank *World Development Indicators,* low income countries have an annual Gross National Income (GNI) per capita of less than $975, middle income countries of less than $11'906 and high income countries are considered all that have a GNI per capita of above $11'906. Today there are 69 high income countries, 104 middle income countries and 40 low income countries. (World Bank 2010, online).

estimated 1.374 billion people lived on less than $1.25 a day and an additional 1.19 billion lived on less than $2 a day. For the human mind these figures are difficult to grasp. Expressed in percentages in South Asia over 40% of the population lived on less than $1.25 a day in 2005, while in Sub-Saharan Africa (SSA) more than half of the population lived in extreme poverty. Even more striking over 70% of the population in South Asia and Sub-Saharan Africa lived on less than $2 a day (World Bank 2010, online). However, by 2015 the number of people living in extreme poverty is expected to fall to around 900 million and an additional 1.1 billion will live on less than $2 a day. If this trend continues, MDG One is within reach, at least on a global scale.

Nevertheless at country level extreme poverty rates remain high and only 49 of 87 developing countries with available data are on track to achieve the poverty target of the MDGs. Furthermore while global inequality, i.e. between countries, is reducing from a high starting point - national average annual incomes per capita range from $280 to more than US$60'000 (in PPP 2010) - inequality within countries has increased; the rich become richer, while the poor remain poor and by 2015 will only have moved from the category "*below $1.25*" into the category "*below $2*". If extreme poverty is defined at a threshold of $2 a day, presently more than two billion people worldwide live in extreme poverty and according to actual trends the situation is not going to change much by 2015. (World Bank 2010, p.2, p.92)

1.3 Multidimensional Nature of Poverty

Although poverty is often associated with lack of income, it is in fact about a wide set of economic as well as social, political and environmental characteristics; it is multidimensional. How to define poverty is thus dependent on which information and characteristics are included or contrariwise excluded. Not only can it be related to physical assets, income-earning opportunities and to consumption, but also to nutritional and health status, access to appropriate services, to learning and educational opportunities, to wider political freedoms and rights, to people's ability to deal with shocks and insecurity and to their status and sense of dignity (DEZA 2009, p.3).

Amartya Sen (1999, p.37) for instance in his book *Development as Freedom* describes participation in economic, political and civic interchange as a basic part of social living free of destitution. He argues that these freedoms are closely tied to each other, but that the poor often lack all of them. Political freedom is present when citizens are free to participate in the political process on an equitable basis, when there is meaningful competition in the political sphere and elections are free and fair. Civil liberties additionally include protection against unreasonable searches, access to fair trials and rights of free assembly, expression and practice of religion (Hanke and Walters 1997, p.119).

There is less clarity regarding the definition of economic freedom, but central elements certainly are secure rights to (legally acquired) property, freedom to engage in voluntary transactions,

inside and outside a nation's border, freedom from governmental control of the terms on which individuals transact and freedom from governmental expropriation of property, e.g. by confiscatory taxation or unanticipated inflation (Rabushka 1991, p.87ff).

While political and civil freedom may go hand in hand with economic liberties, it has to be recognized that a country may be free or democratic in a civil or political sense, but its people may lack economic freedom. At the same time, poor people may lack political or civil liberties, yet have economic freedom. According to Sen "*the effectiveness of freedom as an instrument [for poverty reduction] lies in the fact that different kinds of freedom interrelate with one another; and freedom of one type may greatly help in advancing freedom of other types*."

Furthermore as to focusing solely on income measures to define poverty Sen (1999, p.97) writes poignantly "*income is not all decisive for a dignified and worthy livelihood. It [for instance] appears that even after full note is taken of income levels, black women die young in very much larger proportions than white women in the contemporary United States.*"

1.4 The Base of the Pyramid

When referring to the distribution of wealth in the world often the form of a pyramid is used. It was in 1998 when the concept of the "*Bottom of the Pyramid*" was first introduced[4] and since then it has been used by a growing number of researchers, especially from the development and economic sector (Hart 2007; Hart and Christensen 2002; London 2007; Prahalad 2004; Rangan et al. 2007). The use of figures in the concept up to date remains inconsistent, but generally the distribution of wealth and the capacity of people for income generation can be illustrated in a simple way in the form of a pyramid as illustrated in Figure 2 adopted from Prahalad and Hart (2002, p.4).

Figures here are based on UN world development reports from the late 90s and beginning of the 21st century and meanwhile considerably changed, but the general concept stays the same. At the top there are the wealthy few with more than US$20'000 (PPP) annual per capita income. These are the Tier One consumers composed of middle and upper income people in developed countries and the few rich elites in developing countries. Tier Two and Three are the relatively poor people in developed nations and the rising middle classes in developing countries. Eventually Tier Four constitutes the BoP. According to Prahalad and Hart more than four billion people live on less than US$ 1'500 (PPP) annual income per capita. (Prahalad and Hart 2002, p.5)

[4] In 1998 (online) Prahalad and Hart wrote a working paper on "Strategies for the Bottom of the Pyramid: Creating Sustainable Development".

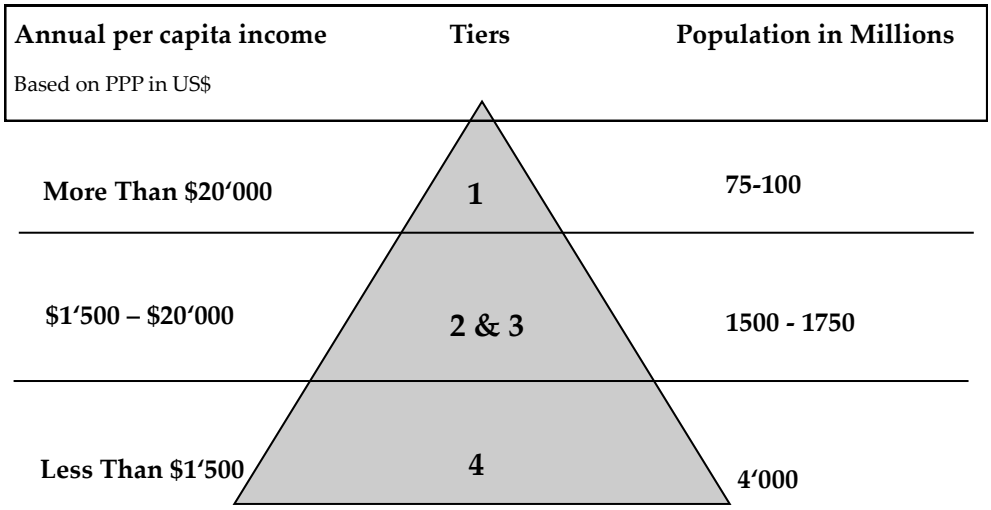

Figure 2: Base of the Pyramid (adopted from Prahalad and Hart 2002, p.4)

It must be pointed out that in literature the per capita annual income that captures the size of the Tier Four BoP population has been used very inconsistently (London 2007, p.9). They range from US$ 1'500 (Prahalad and Hart 2002) and US$ 2'000 (Prahalad and Hammond 2002) to US$ 3'000 (Hammond et al. 2007). London (2007, p.9) argues that relying on specific income levels to separate the global population into different wealth segments is relatively arbitrary. Instead, PPP measures are better viewed as empirical approximations that attempt to capture the essence of the definition of the BoP and should not be considered exact measures. Therefore, the author introduces the term "*low-income people or -population*" to refer to the people at the BoP.

Nevertheless in order to capture the size of the BoP population, the respective total annual household income and to possibly come up with adequate market creation strategies and analyzing tools the consistency of the used figures needs to be guaranteed (Karnani 2007, p.101). To address this issue the World Resource Institute (WRI) conducted two studies to better understand the size and the aggregate purchasing power at the BoP. One in collaboration with the International Finance Corporation (IFC), focusing on a global perspective (Hammond et al. 2007), and the other was conducted with the Inter-American Development Bank (IADB) focusing more on the Latin-American and Caribbean region (WRI 2006). In both studies the WRI and its partners use 2002 US$ 3'000 (PPP) as the annual income threshold that defines those people living at the BoP. While it is not fully explained why US$ 3'000 (PPP) was considered the appropriate threshold, in 2006 nearly 4 billion people at the BoP across Africa, Asia, Eastern Europe, Latin America and the Caribbean are identified. Using data from household consumption surveys, the total annual household income at the BoP in 2006 is estimated at US$5 trillion PPP. (Hammond et al. 2007, p.9)

2 Economic Growth and Markets

Chapter Two first indicates the importance of economic growth for poverty reduction, which is historically proven. Nevertheless people at the BoP do not benefit from all economic growth, but the latter needs to be pro-poor, which strongly depends on governance structures and on how much the poor are actually involved in economic activities. Also the effectiveness of development aid strongly depends on governance structures in recipient countries. Next an introductory market concept is presented as well as the importance of markets in providing for the daily livelihoods of the poor. Expanded access for the poor to various markets is identified as a most critical factor in order to reduce poverty and well-functioning sustainable markets for everybody including the poor are also a precondition for aggregate economic growth. In consequence it is argued that development assistance to be more effective must increasingly focus on changing markets in favor of people at the BoP.

2.1 Economic Growth and Poverty Reduction

Economic growth is not explicitly targeted in the MDGs, yet the historical and empirical record is clear: the single, most effective way to reduce world poverty is economic growth. Income per capita measures are highly correlated with widely used indicators of poverty, health and education. Also in the 19th and 20th century the West's escape from poverty did not occur by chance, but by sustained growth over a long period of time. As countries become richer obviously respective poverty rates fall (Vasquez 2001, p.197). Between 2000 – 2008, for instance, low- and middle-income countries averaged an economic growth of 6.2% a year, and during 1999-2005 the number of people living on less than $1.25 a day fell by 325 million. In 2008 due to the financial crisis and ensuing global recession the global economy grew by only 1.9% and declined an estimated 2.2% in 2009. In consequence some 64 million people more have been living in extreme poverty by 2010 compared to 2009. (World Bank 2010, p.217)

It is however questionable and controversial if all economic growth inevitably leads to an improvement of the livelihoods of the poor and in consequence to a reduction in poverty figures. There are often large differences between countries in how much poor people benefit from aggregate economic growth and the latter can have diverse impacts. As Sen (1999, p.44) writes: *"[…] the impact of economic growth depends much on how the fruits of economic growth are used, i.e. public policies for the financing of health care and insurance, provision of public education, arrangements for local security and so on. […And…] an adequate conception of development must go much beyond the accumulation of wealth and the growth of gross national product and other income-related variables. Without ignoring the importance of economic growth, we must look well beyond it*" (Sen 1999, p.14).

In this respect political, civil and economic liberties for people in developing countries play obviously an essential role. In reality, however, most of the developing world is still far from adopting

a coherent set of policies consistent with political, civil and economic freedom and lack state institutions that are generally conducive to economic growth and poverty alleviation (see e.g. Collier 2007 or Moyo 2009).

2.2 Pro-Poor Economic Growth - Governance and Effectiveness of ODA

Ultimately not only aggregate economic growth is necessary, but this growth needs to be pro-poor. Theoretically pro-poor economic growth can be easily defined as depicted in Figure 3 adopted from Asian Development Bank (ADB) (2011, p.16). In the case of general economic growth, the aggregate economy expands which is shown in the evolution from T=0 to T=1. Second however, in T=2 the slice of the poor grows and the poor thus get less poor compared to the rest of the actors in an economy. The evolution from T=0 via T=1 to T=2 can be defined as pro-poor growth. (Ibid.)

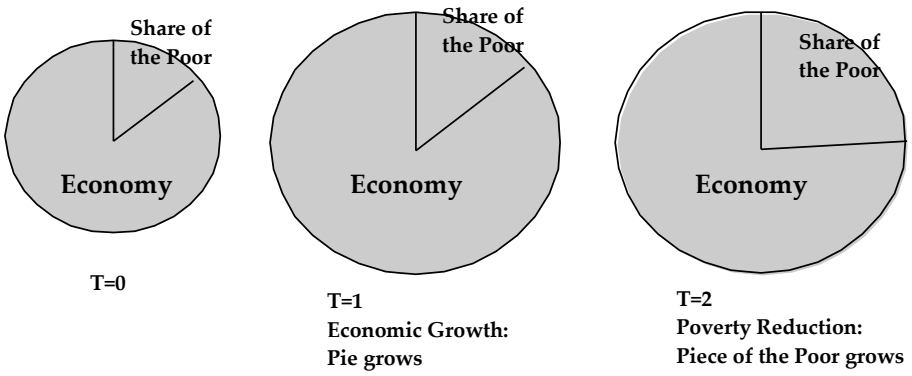

Figure 3: Pro-poor Economic Growth (adopted from ADB 2011, p.16)

In this regard the form of governance in developing countries is of utmost importance not only regarding the protection of the poor, but also as to how economic growth can be achieved in a way to actually reduce poverty. As mentioned this includes political, civic and economic liberties. (Przeworski and Limongi 1993, p.55). Gwartney et al. (2010, p.V-VII), for instance, looked at more than 20 components of economic freedom, ranging from size of government to monetary and trade policy in 123 countries over a 25 year period and to their effect on prosperity. In their study the authors found a strong relationship between economic freedom and prosperity, while freer economies also overall grew faster. Furthermore they revealed that economic freedom is strongly related to poverty reduction and other measures of progress, such as life expectancy, lower infant mortality, higher literacy rates, lower corruption and greater access to safe drinking water. In fact, the UN's Human Development Index (HDI), which measures various aspects of standards of living, positively correlates with economic freedom.

Already since the beginning of modern development cooperation between donor and recipient countries there was a continuing discussion about aid for specific projects versus budgetary

support for a recipient country, so called „*program support*". Naturally regarding budgetary support state institutions and policies in recipient countries become an important matter also for donor countries (Singer 1965, p.539ff). Boone (1996, p.289ff) in this regard, related political regimes to aid effectiveness on poverty and economic growth indices in developing countries. He found that official development aid (ODA) does not significantly increase investment, nor benefit the poor as measured by improvements in the UN's HDI. However it does increase the size of governments, irrespective of them being liberal-democratic or highly repressive. Although Boone showed that mainly the political elite in recipient countries benefits from aid programs, in liberal political regimes and democracies the infant mortality is on average 30% lower than in repressive regimes. Boone thus inter alia concludes that ODA should mainly support the transformation in developing countries towards new liberal regimes.

There is furthermore the issue of how to achieve pro-poor economic growth and how to proceed with development aid and in so called failed states as for instance Somalia, Chad, Haiti or Afghanistan, which are ravaged by civil war and where almost no effective state institutions and governance are present (FFP 2011, online).

To generally sum up, the role of government and governance in determining the outcome of domestic policies favoring the poor, of pro-poor economic growth and of ODA is central, as is the accountability of recipient governments, for instance regarding corruption or the use of means gained through the extraction and export of natural resources. Governance in recipient countries is naturally also decisive regarding the risk of aid dependency and the inclination to change policies and politics internally. In consequence, it is certainly a justified question to what political regimes ODA should be transferred to, and, if effective and efficient governance structures are not guaranteed, if aid in form of program support should be transferred at all. In case of doubtful governance structures an option might be giving ODA predominantly to non-governmental structures such as NGOs under market oriented allocation mechanisms as for instance suggested by William Easterly (2006) and/or focusing on market-based approaches as presented in this thesis.

In short, the goal for both developing countries and the international development community, must be to actively involve the poor in markets and hence allow them benefiting from economic growth as independent and capable actors.

2.3 Importance of Markets for the Poor

In conventional economics markets are seen as the means through which resources are allocated and act as basic arrangements through which buyers and sellers exchange resources in the form of goods or services. When operating under conditions of perfect competition and perfect information, rational market players respond to price signals and thus stimulate choice and

competition, so that for instance producers are continually pressured to improve their products and productivity and, in doing so, eventually offer better value to consumers. In successful economies markets are therefore considered as the central organizing principle and if set within an appropriate framework of rules and norms, functioning markets are a means through which both private and public gains are realized and are the basis for efficiency, competitiveness and aggregate growth (SDC 2008a, p.8).

Of course the assumptions underlying this concept of markets do in reality rarely apply. Markets in contrast are prone to a number of imperfections or failures, such as for instance asymmetric information between different market players and various positive or negative externalities. Markets do not work for public goods that have characteristic of non-rivalry and non-excludability and there exist also other types of exchange such as gift exchange or exchange in an unbalanced hierarchy, when one actor is in a more powerful situation which is especially characteristic for the situation of the poor (Ibid., p.12).

Nonetheless markets, however defined, in reality matter for everyone, people at the BoP included. Markets provide the direct means through which the poor participate in economic activity. As consumers poor people rely on markets to meet their needs for food and other essential goods and services and as employees or producers, they sell their labor or products in markets.

Poor people and their needs are, however, very diverse. They may live in urban or rural locations, come with different cultural backgrounds and in consequence have a wide variety of livelihoods and respective expectations towards life. Yet the needs of all these poor people are often unmet. In many cases they not only lack private goods and services such as food, clothing and housing, but also basic, mostly state provided public services such as education, health, clean water, electricity or access to telecommunication. Moreover since many poor live in places and regions with limited government service provisions, they often rely almost exclusively on private markets to provide for their needs (Ibid., p.8).

Such markets are often informal, e.g. participants do not have formal titles to their property and are judicially unprotected, they are uncompetitive, e.g. controlled by inefficient and/or monopolistic middlemen and they are often very costly or difficult to access. People at the BoP are thus often impacted by a "*BoP penalty*". They pay higher prices for basic goods and services than do wealthier consumers, be it in cash or in the effort they must expend to obtain them and they often receive lower quality of products and services as well. For example it is the people at the BoP who often pay more for the transportation to reach a distant hospital for treatment or who face exorbitant fees for loans or for transfers of remittances from relatives abroad (Hammond et al. 2007, p.5).

The underlying rationale of market-based approaches for development at the BoP in consequence stems from the appreciation of the importance of markets in the daily livelihoods of the

poor and from the fact that presently markets often neither work effectively in favor of the poor nor serve their needs adequately. Further, present development assistance programs often ignore the potential that lies in market forces to fight poverty.

3 Development Assistance

The aim of Chapter Three is to first define and quantify official and private development assistance and then put it into perspective as to the amounts and effects of remittances sent home to developing countries by migrant workers. Next the evolution of modern international development aid is quickly presented as well as which theoretical rationales were at which time predominant in order to place market-based development approaches in a broader historical context. The controversies about the effectiveness of development aid are then demonstrated by contradicting empirical results taken from the actual scientific literature. In the end the main debates in the actual Western aid system are analyzed in order to justify the necessity and explain the rationales of market-based development approaches at the BoP to fight poverty.

3.1 Official and Private Development Assistance

Development assistance has to be distinguished from humanitarian aid; the former focuses on long term assistance, the latter on short-term humanitarian emergency support in developing countries. Nevertheless both fall into the same category of Official Development Assistance (ODA) from donor to recipient countries. Today ODA comes mainly from the 24 Members of the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD), including the European Commission (EC). The World Bank, the IMF and the United Nations Development Program (UNDP) participate as observers. Other countries, for example Brazil, Russia, India and China (BRIC) are in manifold ways also involved as donors to developing countries, but this master thesis focuses on the "*Western*" aid system and does neither have space nor time to investigate further in this regard.

ODA currently is defined as those financial "*flows to countries, territories […] and to multilateral development institutions which are: (1) provided by official agencies, including States and local governments, or by their executive agencies; and (2) each transaction of which: a) is administered with the promotion of the economic development and welfare of developing countries as its main objective; and b) is concessional in character and conveys a grant element of at least 25 per cent (calculated at a rate of discount of 10 per cent)*" (OECD 2010a, online). ODA may be bilateral given from one country directly to another or it may be multilateral given by a donor country to an international organization such as the World Bank or any UN agency. The proportion is currently in the form of about 2/3 bilateral and 1/3 multilateral ODA (OECD 2010b, online). ODA is governmental aid and does not include private contributions, private

capital flows or any other private investment. In 2010 about 80-85% of net development aid to recipient countries came from government sources in the form of ODA and the remaining 15-20% of net grants came from private organizations such as NGOs, foundations, charities or individuals (OECD 2010c, online).

Development Assistance - ODA and Private (net disbursements in constant prices (2008) in m US$)										
Year	**1991**	**1993**	**1995**	**1997**	**1999**	**2001**	**2003**	**2005**	**2007**	**2009**
ODA	98062	90775	83057	79149	85264	93726	104744	140441	126878	144373
Bilateral ODA	73539	64409	58345	55393	61348	64723	77492	109292	93371	105176
Multilateral ODA	24034	25960	24712	23756	23916	29002	27252	31149	33507	39197
Net Private Grants	8221	8565	8081	7314	9191	10277	12738	16843	18968	22198
data extracted on 04 Jan 2011 from OECD.Stat (online)										

Table 1: Development Assistance - ODA and Private (OECD 2011, online)

As can be seen in Table 1 the post-Cold War decade did not see some of the savings from reduced military budgets being put towards increased aid, but was marked by a strong and continuing case of aid fatigue influenced by the rising fear that foreign assistance was generating "*aid dependency relationships in poor countries*" (Thorbecke 2000, p.47). Yet since the late 1990s foreign assistance to developing countries has been constantly on the raise, both in form of ODA and of private grants.

This raise in ODA, however, has to be put into perspective. Mainly because already in 1970 at the UN General Assembly donor countries promised to spend 0.7% of their Gross National Product (GNP) on ODA. The deadline then to reach that target was the mid-1970s (UN 1970, p.43). At the Monterrey conference in Mexico in 2002 and the follow-up conference in Doha in 2008 the UN community and in particular OECD Members renewed their promise to spend at least 0.7% of their Gross National Income (GNI) on ODA.[5] Today still almost all rich nations fail this obligation. Instead of 0.7%, the amount of aid from developed countries has been around 0.2% to 0.4% in the last decade. In 2009 only Sweden, Norway, Luxembourg, Denmark and the Netherlands fulfilled their obligation and the DAC countries overall spent 0.31% of their GNI on ODA (OECD 2010d, online).

Also the definition and interpretation of ODA changed throughout the years. The original definition did not include debt relief or humanitarian emergency assistance. In 1970, "*ODA was to be understood as bilateral grants and loans on concessional terms, and official contributions to multilateral agencies*" with the goal of long term development inside a recipient country (Shah 2010, online). Today a broader definition and interpretation of ODA has been conceptualized and donor countries consider for instance the following expenses as ODA: subsidies on exports to developing countries, debt relief,

[5] Note that terminology is changing. GNP, which the OECD used up to 2000 is now replaced with the similar GNI, Gross National Income which includes a terms of trade adjustment (Shah 2011, online)

food aid, administrative costs, provision of surplus commodities, payments for care and education of refugees in donor countries, technical cooperation grants which pay for services of nationals of the donor countries and grants to NGOs and to domestic agencies (Shah 2010, online).

Some authors thus think that the aggregate aid of the developed world can be reduced to one fourth to receive an estimate of the actual on-site aid received by recipient countries (Niggli 2008, p.34). The overall amount of ODA to recipient countries should in addition not be overestimated. The public in the West sometimes believes that developing countries entirely depend on ODA. However aid money from the West accounts only for a small part of what is yearly spent in the fight against poverty. Most aid programs are financed by the respective developing countries themselves. India for instance that receives practically no ODA spends yearly around 30 billion US$ on educational programs for the poorer part of its population. And also in Africa, where foreign aid is much more present, ODA in the average of all countries only accounts for around 5 percent of total government spending (Duflo and Banerjee 2011, p.12).

3.2 Remittances

Besides ODA it is important to mention remittances as a decisive factor contributing to poverty reduction. Remittances are small money transfers by a foreign worker to his home country, typically US$100, 200 or 300 at a time. In 2006 150 million migrants worldwide sent home around 300 billion US$ to their families in developing countries, thus considerably exceeding the total amount of ODA and private grants of that year (IFAD 2007, p.2).

Regarding the effect of remittances on poverty certainly this money is primarily used to meet immediate family needs, i.e. for consumption, but a significant portion is also available for savings, credit mobilization and other forms of investment, thus supposed to have a positive effect on poverty reduction. Yéro Baldé (2011) for instance investigated the macroeconomic impact of remittances on savings and investment in Sub-Saharan Africa (SSA) and analyzed comparatively the effectiveness of remittances and of ODA in promoting savings and investment. Using respective samples of 37 and 34 SSA countries over the period 1980-2004, the results suggest that both remittances and foreign aid promote savings and investment in SSA, but remittances are by far more effective. For instance a 10% increase in remittances increases savings by 7% and investment by 6.5%, while the same 10% increase in foreign aid increases savings and investment by respectively 1.6 % and 1% only. According to these results, remittances in SSA, although less important in volume and in percentage of GDP, are more effective in boosting savings and investment than ODA. However the author concludes that if foreign aid is used efficiently and effectively, it can be an important complement to remittances by allowing a vulnerable household to have an income above the threshold subsistence level. In consequence they are able to use a larger share of remittances for savings and investment purposes. (Baldé 2011, p.1)

3.3 Historical Review of Modern International Development Assistance

There is some evidence that international development aid already existed in antiquity, but modern international aid began to emerge only in the late 19th and early 20th century when Western powers started to assist their colonies in the development of their economies and infrastructure (Kanbur 2006, p.1562). Important sectors however like education or agriculture were excluded and an additional goal of the aid of the United Kingdom (UK) was for instance „*to promote employment in Britain by stimulating the colonial economies and their demand for British exports. Funds […] had to be spent on British products as far as possible.*" (Little and Clifford 1965, p.31). Only after the Second World War the current aid systems came into being. It is commonly agreed that the Marshall Plan and the setting up of the institutions of the World Bank and the International Monetary Fund (IMF) at the Bretton-Woods Conference were the two major events in the evolution of international aid in the 1940s. Moreover the United Nations (UN) founded in 1945 and the consecutive launching of a multitude of UN agencies represents the multilateral tendency in development assistance. Although for both the Marshall Plan and the World Bank the objective was the reconstruction of war ravaged Europe and not the development of the non-industrialized world, attention soon began to turn to developing countries. Famous is Harry Truman's inaugural speech in 1949 with the objective of "*[...] making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas.*" (Truman 1949, point 44)

After the end of the Second World War the central geopolitical factor determining aid became the Cold War. The main objective of Western aid during that time was to hinder developing countries going over to "*the other side*" which of course was also the objective of aid from the Soviet bloc (Kanbur 2006, p.1563ff). Throughout the 1960s and 1970s bilateral assistance from developed to developing countries expanded, as well as the assistance from multilateral organizations, particularly the World Bank, the IMF and various UN agencies. Since aid for the reconstruction of Europe and Japan was largely not needed anymore, the focus turned increasingly to developing countries. Soft loans - loans with a below market rate of interest - were becoming prevalent and regional Development Banks were founded in Asia, Africa and Latin America. This multilateral approach to aid reflected a general understanding that "*consortia*" of donors can overcome coordination and other problems of a multitude of individual national aid programs (Rosenstein-Rodan 1968, p.223). It was the time of authors like Rosenstein-Rodan (1943, 1961) and his "*Big Push Model*", of Rostow (1960) and his „*Five Basic Stages of Economic Growth*" and of Chenery and Bruno (1962) and their „*Two-Gap Model*". In their different approaches, these authors argued that the main constraint to economic development is capital accumulation, and the role of aid is supplementing domestic savings in developing countries. Developing countries are confronted with strong market failures and externalities that the government and central planning have to play a key role in managing. Investments into infant industries have to

be planned and the latter in their early stages protected from external competition.

The 1970s and 1980s saw the two OPEC oil shocks of 1973 and 1979 and ended with the fall and eventually the collapse of the Soviet bloc and the end of the Cold War. The earlier optimism about growth through capital investments from developed countries was somehow weakened and attention towards basic needs and direct beneficial outcomes for the poor opposed the "*trickle down*" belief from general growth (Fishlow 1972, p.392). It was the decades when democracies in the West moved towards conservative administrations, as those of Ronald Reagan in the US, Margaret Thatcher in the UK or Helmut Kohl in Germany. Consequently there was a decisive movement towards supporting liberal laissez-faire and free-market based approaches for development. Scholars as Little (1965), Krueger (1978), Bhagwati and Eckhaus (1970) or Balassa (1971) pointed in particular to these new rationales and the need for "*structural adjustments*" in recipient countries.[6] This meant that the overall policies in a developing country were regarded to be the key determinant of development and liberal, market-oriented policies were regarded to be the best (Kanbur 2006, p.1565). In the 80s in consequence financial transfers for development were increasingly made in the form of budget support conditioned on policy reform in the recipient country that conformed to the principles of the Washington Consensus[7]. Also debt relief or financial support in the aftermath of debt default was conditioned on policy reform.

These conditions and their outcomes led to a massive public debate, also within the civil society. Some argued for an "*adjustment [of the conditions] with a human face*" (Cornia et al. 1987), while others declared that the aid doctrine of the 80s was solely in the interests of the creditors of the North and should be rejected all together. The latter in this regard called for total debt cancellation or at least major debt relief. (Kanbur 2006, p.1565)

Nevertheless in the first half of the 90s the structural adjustment policies continued to be adopted, especially to the transition of the former centrally planned economies of the successor states of the Soviet Union. Many scholars supported a rapid transition process to free market, open trade, capitalist systems and the term "*shock therapy*" was created to describe this process. However by the second half of the decade the disastrous consequences of the transition in many countries ("*more shock than therapy*") could no longer be ignored and the structural adjustment policies were increasingly reassessed (Stiglitz 2000, p.27-35).

Apart from this transitional process, the major event of the 1990s was the East Asian financial crisis in 1997 and the subsequent crisis in Latin America and in Russia, with significant spill-over

[6] A good summary of this way of thinking is provided in Krueger (1978).

[7] The term Washington Consensus refers to neoliberal policies generally advised and implemented both for advanced and emerging economies. Sometimes it is used in a narrower sense to refer to economic reforms prescribed for developing countries, including advice to reduce government deficits, to deregulate international trade and cross-border investment, and to pursue export-led growth. For more details and a history of the term, see Williamson (1999, online).

effects for most developing countries. Many critics blamed the crisis on too rapid liberalization of capital accounts, being the result of the over-confidence in market forces that ruled in the 1980s and the first half of the 1990s. Especially the World Bank and the IMF were heavily criticized as being the means of selfish policies of rich countries (Sakakibara 2001, p.244).

In consequence during the late 1990s and in the first decade of the 21st century the development rationale moved gradually back to emphasizing poverty reduction as the ultimate objective of development and to supporting specific interventions to this end. Signing and ratifying the United Nations Millennium Declaration in 2000 all 192 UN Member States agreed to achieve eight Millennium Development Goals by 2015. They are (1) eradicate extreme poverty and hunger, (2) achieve universal primary education, (3) promote gender equality and empower women, (4) reduce child mortality, (5) improve maternal health, (6) combat AIDS, malaria and other diseases, (7) ensure environmental sustainability and (8) develop a global partnership for development (UN 2011, online). These MDGs represent best the new rationales for development in the 21st century and presently serve as a benchmark for most aid interventions in the developing world. Also market creation approaches at the BoP have to measure up to the MDGs, if the goal is to actually improve the livelihoods of the poor and not only generate profits for the private sector. In this regard in 2009 the economist Ted London (2009), for instance, devised a methodic framework which allows both private and public actors assessing and enhancing their BoP-ventures regarding their poverty alleviation effects at a local level.

3.4 Effectiveness of Past and Present Development Assistance

The success and the effectiveness of the past and present Western aid for developing countries can certainly be questioned. Robert B. Zoellick, the current president of the World Bank, writes in a guest article for Le Monde in 2010 that "*[...] the first time in history more than one billion people go to sleep with an empty stomach every night*" and in 2010 alone the World Bank estimates that an extra 64 million people will have fallen into a life in extreme poverty (Le Monde 2010, online). William Easterly (2006, p.5) asks in his critical book towards the past and current aid system "*why the West spent $2.3 trillion in foreign aid over the last five decades and still has not managed to get 12 cent medicines to children to prevent half of all malaria deaths?*".

In the debate about the aid system two different questions are, however, frequently intermingled; on one hand there is the question of how countries in Asia, South America and Africa can be relieved of poverty, mass misery and accordingly the deprivation of freedom of choice and on the other hand there is the question of what development cooperation between rich and poor countries can achieve for poverty reduction (Niggli 2008, p.9). The principal question is thus not about if aid at all should be transferred from donor to recipient countries, but about what kind of aid is

effective and how it should be planned and implemented.

Nevertheless there are many studies stating that development aid up to present had no appreciable impact on poverty figures and other development indices in recipient countries and in consequence the effectiveness of the current aid system is not only strongly criticized, but at large put into question. Reichel (1995) for instance analyzed the impact of ODA on savings and economic growth in recipient countries during the 1980s. The statistical results suggest a negative causal impact of ODA on domestic savings and as income growth rates are not significantly affected by aid payments, the overall effect of aid is concluded to be negative. Reichel argues therefore in line with the mainstream thinking of the early 90s that domestic savings as well as income growth in developing countries crucially depend on national economic policies favoring free trade orientation and maintaining low inflationary levels (Reichel 1995, p.279-296).

Also Doucouliagos and Paldam (2005, p.1, p.17) express a pessimistic view as to the effectiveness of aid on growth in recipient countries. They summarized 97 studies analyzing the effects of development aid on economic growth while ignoring the effect of the Dutch disease[8]. According to their study the effect of aid on growth in recipient countries is insignificant. They found that investments in recipient countries rise by only around 25% of the amount of aid and the rest is crowded out by a fall in savings due to increased public consumption.

There are however also numerous studies indicating that ODA is very well effective and has considerable effects on development indices in recipient countries even in the short term. Clemens, Radelet and Bhavnani (2004) for instance divided ODA into three categories to analyze the effect of aid on economic growth in 67 developing countries: (1) emergency and humanitarian aid, likely to have no or a negative correlation with growth, (2) aid that affects growth only over a long period of time, if at all, like aid to support democracy, the environment, health or education and (3) aid that plausibly could stimulate growth in a four year period. In their study they focused on the third group of aid, like budget and balance of payments support, investments in infrastructure, and aid for productive sectors such as agriculture and various industries, which accounts according to calculations by the authors for about 53% of all aid flows. They found a large positive, causal relationship between this "*short impact*" aid and economic growth in which in a four year period a $1 increase in such aid raises output and income by $1.64 in present value in the typical country. They found furthermore evidence that the impact on growth is somewhat larger in countries with stronger institutions and/or longer life

[8] The concept of Dutch disease in development aid explains at a national level the relationship between the inflow of foreign aid and a decline in the manufacturing industry. The mechanism is that an increase in revenues from foreign aid will make a given nation's currency stronger compared to that of other nations manifested in the exchange rate, resulting in the nation's other exports becoming more expensive for other countries to buy, making the manufacturing sector less competitive. While the concept most often refers to natural resource discovery, it can also refer to "*any development that results in a large inflow of foreign currency, including a sharp surge in natural resource prices, foreign assistance, and foreign direct investment*". (Ebrahim-Zadeh 2003, online)

expectancies and that there is a significant negative relationship between debt repayments and growth (Clemens et al. 2004, p.1).

In the end there is no final empirical conclusion as to the effectiveness of development aid on various indices such as for instance economic growth or the UN's HDI. Results vary from author to author according to their political or economic agendas and the issue stays controversial. In consequence the introduction and testing of the effectiveness of new market-based approaches for development in developing countries is not only necessary, but as is argued here indispensable. Next therefore several further rationales are presented to substantiate this claim.

3.5 Rationales for Market-based Development Approaches

3.5.1 Limit Central Planning

Peter Bauer, a libertarian development economist, was one of the first to oppose the idea that the most effective way to help developing countries advance is through state-controlled foreign aid. In his works he argues that centrally planned foreign aid, large scale public investment, price controls and protectionism perpetuate poverty and that increasing government intervention will lead to inequality in the distribution of power, to corruption, to misallocation of resources and will erode individual freedom and civil society. For Bauer, the essence of development is the expansion of individual choices and the role of the state to protect life, liberty and property so that individuals can pursue their own goals and desires. Thus for Bauer centrally planned government-to-government aid is neither necessary nor sufficient for development, and will actually hinder it (Vasquez 2007, p.197; Bauer 1948, 1954a, 1954b).

Also Milton Friedman already in the 1950s noticed that "*foreign economic aid is widely regarded as a weapon in the ideological war in which the United States is now involved. Its assigned role is to help win over to our side those uncommitted nations that are also underdeveloped and poor […].The objectives of foreign economic aid are commendable. The means are, however, inappropriate to the objectives […].The proponents of foreign aid have unwittingly adopted a basic premise of the Communist ideology that foreign aid is intended to combat. They have accepted the view that centralized and comprehensive economic planning and control by government is an essential prerequisite for economic development […].An effective program must be based on our ideology, not on the ideology we are fighting*" (Friedman 1958, p.63, p.77-78).

Nowadays in the present debate William Easterly is probably the most famous opponent of central planning. He believes that in order to be successful in development aid one has to be a Searcher instead of a Planner. Easterly (2006, p.5-6) writes: "*The short answer on why dying poor children don't get twelve-cent medicines, while healthy rich children do get Harry Potter, is that twelve-cent medicines are supplied by Planners while Harry Potter is supplied by Searchers […]. Planners announce good intentions but don't motivate anyone to carry them out; Searchers find things that work and get some reward. Planners*

raise expectations but take no responsibility for meeting them; Searchers accept responsibility for their actions. Planners determine what to supply; Searchers find out what is in demand. Planners apply global blueprints; Searchers adapt to local conditions [...]. A Searcher admits he doesn't know the answers in advance; he believes that poverty is a complicated tangle of political, social, historical, institutional, and technological factors".

Market-based development approaches in this regard limit the amount of central planning, because they focus on the livelihoods and needs of the poor at individual level and not on states and on governance structures. The goal is to both involve the poor as consumers and producers in markets as capable and independent actors. In market-based development approaches it is eventually the poor who decide what to buy, consume or produce and how they wish to plan and live their life.

3.5.2 Limit Conditionality, Tied Aid and Incoherence

In the debate about what development aid is actually effective a much wider set of issues can be found. Some of them have a long historical background, like what benefits aid brings to the donors or the conditioning of aid transfers, others in contrast are new. The role of aid in supplying various international public goods, like knowledge and technological know-how for instance is a relatively new issue (see e.g. Stiglitz 1999). (Kanbur 2006, p.1563)

As cited the modern aid system was in the first four decades of its existence always subordinated and conditioned to the requirements of the Cold War. Although since the 1960s economic development experts indicated the inefficiency of conditional aid (see e.g. Bhagwati and Eckhaus 1970), each super power and their allies aided regimes friendly to their interests and gave money only conditional on specific politically motivated requirements. Only two decades ago the aid system has been freed from this corset and is now less focusing on political aid towards friendly regimes. (Niggli 2008, p.89)

Since the 1970s according to a UN General Assembly Resolution the form of "*financial aid will, in principle, be untied. While it may not be possible to untie assistance in all cases, developed countries will rapidly and progressively take what measures they can […] to reduce the extent of tying of assistance and to mitigate any harmful effects and make loans tied to particular sources available for utilization by the recipient countries for the purpose of buying goods and services from other developing countries. […] financial and technical assistance should be aimed exclusively at promoting the economic and social progress of developing countries and should not in any way be used by the developed countries to the detriment of the national sovereignty of recipient countries.*" (UN 1970, para. 45-47)

Nevertheless still today conditionality and tying of aid remains strong. For instance between 2001 and 2009, there was a sharp increase in aid, but according to Shah (2010, online) much of it due to geostrategic concerns of donor countries, such as for instance fighting terrorism. Also according to Shah the sharp increases in 2005 were largely due to enormous debt relief for Iraq, oil producing Nigeria, plus some other one-off large items. Hirvonen (2005) argues that an aid system based on the

interests of donors instead of the needs of recipients makes development assistance inefficient and too little aid reaches countries that most desperately need it. Also all too often, aid support is wasted on overpriced goods and services from donor countries. According to her, development assistance up to present is still primarily designed to serve the strategic and economic interests of the donor countries or it is designed to benefit powerful domestic interest groups in the donor countries. Also in this regard development assistance analysts and economic experts focused since the 1960s on the issue of transferring agricultural surpluses in the West as the result of farm price supports in the form of aid to recipient countries. It is argued that such food aid harms the recipient countries by hitting their national agricultural production with cheap or even free imports (Schultz 1960, p.1019ff). It is also worth noting that today in the context of international trade developing countries are still faced with restrictive and unfavorable trade conditions from the West such as trade barriers (tariffs, quotas or bans) or subsidies especially in the agricultural sector in developed countries (Moyo 2009, p.114ff).

Another widely controversial issue are possible incoherencies between different foreign policies of the same donor country. Niggli (2008, 73) for instance mentions that in Switzerland economic foreign policy goals of the Federal Department of Economic Affairs (DEA) often directly contradict development policy ends of the Swiss Agency for Development and Cooperation (SDC).

In consequence of the outlined issues and controversies when development aid effectiveness and efficiency is evaluated it has to be exhaustively and in detail considered of what amount they actually are, which parts of the aid transfers are oriented towards on-site development in the recipient countries, to what regimes, if they are free of incoherence problems and if they do not primarily serve the national interests of the donor country. Of course an in depth analysis of these issues exceeds the space and time in this thesis. Market-based development approaches, however, allow effectively avoiding these controversies. The rationale is that only by generating higher incomes poor people can be lifted out of a livelihood in destitution, so they have to be provided in a sustainable manner through private market channels with products that are supposed to make them and their families more productive. The next chapter thus presents market creation approaches at the BoP. More specifically the targeted customers are smallholding farmers and the product focus is on affordable drip technology. The goal is to show that a market creation approach at the BoP actually works and how it works in supporting pro-poor development and may serve as an exit strategy for the present widely controversial development cooperation system.

4 Market Creation at the Base of the Pyramid

In the last few years there has been a sharp rise in interest in market-based development approaches not only from development organizations, but also from private businesses. There is the United Nations Development Program's (UNDP) *Growing Inclusive Markets* (UNDP 2010), the IADB's *Opportunities for the Majority* (IADB 2010), the IFC's *Next Four Billion* (IFC 2010) and the *Making Markets Work for the Poor* (M4P) approach of various private development organizations and public state agencies. Moreover private businesses are increasingly interested in social investment, sustainable business practices, Fair Trade and engaging in general with the BoP. These ideas are crossing sectors, as organizations in the private-commercial as well as non-profit, governmental and development sector are interested in applying BoP ideas to their initiatives and projects (Gardetti 2007, p.65).

The central idea of all these approaches is that poor are dependent on markets for their livelihoods and therefore sustainably changing those markets to work more effectively in favor of the poor will improve their situation.

Chapter Four introduces first the scientific background of a pure business approaches at the BoP and analyzes it in a critical manner. It is shown that markets and respective market systems are too complex that neither the private nor the public sector alone can successfully intervene in the favor of the poor, but both sectors need to cooperate. This complexity is illustrated with some specific examples of formal rules and informal norms as well as supporting functions that are all necessary for a market to work sustainably. Chapter 4.3 is then entirely devoted to specific conditions an agency implementing a market creation program needs to fulfill. Necessary steps and levels to move through are presented in order to be able to eventually deliver independence of the market and of the stakeholders involved and hence to generate sustainable results. The Chapter closes by indicating specific characteristics a facilitating agency should bring along and principles it must base its activities and tasks on.

4.1 Business Approaches

In the business sector it was the work of Prahalad, Hart and Hammond that contributed most to the emergence of the BoP field. As mentioned in 1999 the term BoP was first brought up and in 2002 Prahalad and Hart wrote their influential article "*The Fortune at the Bottom of the Pyramid*". This article wanted to raise awareness about the global socio-economic pyramid in general and specifically about the vastly untapped market potential and growth opportunity for multinational companies by engaging with the billions of people living in poverty. Because of their global resource and technology base, multinational companies were seen as the driving force behind this new business concept (Prahalad and Hart 2002). Further in 2002 Prahalad and Hammond stressed that doing business at the BoP promises to provide important competitive advantages for companies. At the BoP not only a great

market potential may be found and a source for companies to grow, save costs and get access to innovation, but by doing business at the BoP multinational companies could also bring social benefits and radically improve the lives of billions of people. Eventually business activities at the BoP may result in a benefit for everyone when basic goods and services are provided that help improve the poor's standard of living while generating an acceptable return on investment for businesses involved. (Prahalad and Hammond 2002)

However regarding such an optimistic business approach it is not plausible how selling products or services that do not increase the productivity and do not rise income such as TV sets or furniture or are even harmful such as bleaching crèmes, cigarettes or alcohol might help to reduce poverty (Walsh et al. 2005, p.478). Karnani (2007, p.13, p.99) in this respect proposes a wider perspective on how the private sector can help in alleviating poverty. According to him the most important point is to increase the real income of the poor. Private businesses, rather than focusing on the poor as consumers, need to view them as business partners and for instance provide better quality jobs. Companies should consider buying from rather than selling to the BoP. Furthermore Karnani argues that increasing the real income of the poor is possible by either lowering the prices for products of the same quality or by increasing quality of a product while selling for the same price.

Polak (2008, p.74) in this line points out that what is needed from private businesses are new simple solutions especially designed for poorer people. He argues that most multinational companies and their designers work for the Tier One only and that 90% of the world population is thus left out. Adequate designs for the poor in contrast to designs for Tier One customers must focus ruthlessly on "*affordability, miniaturization and infinite expandability*".

Another much celebrated concept of serving the poor profitably is the so called "*sachet revolution*", i.e. by selling single-serve units of products to make them more affordable to the poor. However, "*putting products in small packages […] does improve convenience and cash flow management, but not the real affordability*". On the contrary, packaging costs, distribution costs, transaction costs and so forth are clearly higher with small packaging (Chowdary 2008, online).

Additionally here the issue of micro credits must be quickly looked at. Certainly access to micro credit systems or purchasing on credit can increase consumption possibilities of the poor; however it is again essential that products and services bought on credit are either consumed in a way that enhances productivity or that they become productive assets. Otherwise, the poor may end up consuming too much and saving too little for the future and, even worse, getting into a debt spiral. Since lending at the BoP is however a reality, Prahalad (2004, p.3) indicates correctly that access to adequate micro credit systems can improve the situation of the poor because they do not have to rely exclusively on local money lenders anymore, who sometimes charge usurious interests.

In the end since low-cost products and services aimed at poor customers must be sold cheap

and therefore margins kept low, these low margins only provide low profits and it takes considerable time to recover investments for instance in R&D, marketing and the creation of an efficient supply chain. In consequence manufacturers, wholesalers and retailers may not have an interest in investing into such products and prefer dealing with higher margin products for richer customers, where money is more easily made. This thesis in consequence argues that leaving market-based development approaches to the private sector alone will not solve the problem. Contrariwise in order that productivity enhancing products actually reach the poor, public agencies and institutions need to step in and finance certain tasks for which the private sector will not pay because the costs are very likely not recoverable. Moreover markets for the rich and poor are of high complexity and are never able to work effectively and efficiently if not set in an adequate context of rules, norms and supporting functions, which are often missing in developing countries. Such a context needs to be influenced or even built up by not-for profit funds of facilitating agencies in cooperation with various public and private institutions.

4.2 Complexity of Markets

As mentioned markets are of high complexity and may affect the poor in various forms. When creating a market for a productivity enhancing product and marketing it at the BoP a profound understanding of the local context is thus essential. Not only to help analyzing characteristics and conditions necessary to create a market, but also to give specific guidelines for action to change a context in favor of the poor.

A sustainably functioning market is not only composed of a core space for transactions of a good or service provided by the private sector (supply and demand), but a market is always set in a wider context. This context consists of formal rules and informal norms provided by governments, local organizations or they are a product of the local culture and value system. There are also a range of additional functions that support a market and might help developing and expanding it, such as consultation services, R&D, capacity development or coordination provided by various public and private, for-profit and not-for-profit institutions. Such a market system of rules, norms and supporting functions is moreover likely to be influenced by other markets. Accordingly often interventions in one market system have to be coordinated with interventions in another market system in order to become effective (SDC 2008a, p.29). This complexity of markets is further illustrated with some specific examples.

4.2.1 Formal Rules and Informal Norms in Markets

A legal system of formal rules, capable of enforcing contracts, of protecting private persons and their property rights and of fighting corruption is central for a sustainably functioning market. Unfortunately such rule of law is missing in much of the developing world and people at the BoP are

likely to suffer most because of this (Gwartney et al. 2010, p.V-VI). Not only do they have fewer resources to protect their rights, but rule of law itself is related to economic growth (see e.g. Barro 2000, p.31ff).

Further important in this respect is bureaucratic regulation. To have an idea of the differences of bureaucratic regulation between countries the cases of Canada, India and Kyrgyzstan are exemplarily considered here. According to studies by the IFC (2011, online), in Canada in 2010 it took five days, one bureaucratic procedure and US$156 PPP to open a business. In contrast an entrepreneur in India must pay US$1886 PPP in fees (excluding bribes), wait 29 business days and go through 12 procedures to do the same. In Kyrgyzstan the operation takes 10 business days, 2 procedures, and US$83 PPP (excluding bribes). Gwartney et al. (2010, p.V) not only showed that the freedom to operate and compete in the market is circumscribed in many developing countries, but that costly bureaucratic barriers favor big firms at the expense of small enterprises and push a large proportion of a country's population into the informal economy.

The informal economy in the developing world is comparatively large due to another factor. That is the private property rights of the poor are not legally recognized. Peruvian economist Hernando De Soto (2000) documented how people at the BoP around the world have no security in their assets because they lack legal title to their property. In rural Peru for example 70 percent of poor people's property is not recognized by the state. Without secure private property rights, the poor cannot use collateral to get a loan, cannot take out insurance, and find it difficult to plan in the long term. Ending this would allow poor people using their assets to create wealth and permit them to fully benefit from economic activity. As De Soto shows, the poor in fact are asset rich. According to him, the assets of the poor in developing countries are worth 40 times the value of all foreign aid since 1945. In the limited places where poor people's property has been registered, the results were impressive. New formal businesses were created, production increased, asset values rose 200 percent, and credit became available. (Vasquez 2001, online)

Regarding informal norms, culture and mentality issues are of high importance and have to be considered and respected by both public and private institutions that want to implement market-based development approaches. Cultures and mentalities also affect to what extent more formal rules are respected (SDC 2008a, p.29). Informal norms concern attitudes towards innovations, gender roles, local traditions as to economic, social or agricultural livelihoods, etc. People at the BoP for instance can be unwilling to take on additional or new technologies and prefer old, traditional ways of livelihood. Or gender roles may change due to the introduction of a new technology. In Orissa, India the introduction of the treadle pump[9] by the NGO International Development Enterprises (IDE) for

[9] An easy to install and simple to use, low-cost pump that works without electricity or diesel, but with pedaling and allows moving irrigation water vertically as well as horizontally.

instance changed considerably the women's participation in agriculture. In the past they played a major role in livestock management and did not participate in agricultural work. With the introduction of the treadle pump many women started becoming responsible for irrigating their field. However also different Casts in India have different working mentalities and it turned out that the male Brahmins in majority refused buying treadle pumps, because they did not want their women to start helping in the field (Ramaswamy and Sengupta 2002, p.71).

Generally perspectives to change agricultural techniques such as irrigation methods or cropping patterns by introducing a new technology thus strongly depend on local mentalities and cultures. Institutions that want to create or change a market in consequence have to both respect and influence such context specific norms and rules, formal and informal, in order to produce sustainable outcomes.

4.2.2 Supporting Functions in Markets

There are further functions in markets that have supportive effects and/or play an integral role, but do not belong to the core activities of demand and supply. Companies in a market for instance need business services such as logistics, production know-how, quality control or commercial justice services. If these are not provided a market is unlikely to function well (SDC 2008a, p.29).

At the level of the poor in order to be able to capitalize their capabilities in markets they need to be to a certain extent healthy and educated. Health and education are mostly provided by government authorities, which however often do not work effectively in developing countries. Farmers in order to be productive and raise income not only depend on effective agricultural inputs such as quality tools, seeds and fertilizers, but also on general agricultural know-how and knowledge provided by either private or public institutions (e.g. agricultural universities or agro-clinics). Collecting and transferring agricultural know-how and methods from innovative farmers to others in this regard can also be considered a supporting function.

Of utmost importance is reliable access to markets where farmers can sell their harvest under fair conditions. Only providing a productivity enhancing technology will not help much, if a farmer is not able to sell the crops for a decent price on local, regional or international markets. Also connecting farmers to niche markets, i.e. via organic certificates needs to be mentioned in this regard. The availability of price information in various market systems is furthermore noteworthy, as well as grading, sorting and packing of harvested crops. All these supporting functions help farmers fetching higher prices.

Sales intermediaries - although often criticized compared to direct sales - may also provide a supporting function, since they take over some of the risks and may better guarantee links to more distant and lucrative markets. (Rajshekar and Ravi undated, p.31-32)

All the outlined examples are necessary for a market to function sustainably and to include

the poor effectively. The extent and necessity of supporting functions varies depending on a specific market and only a brief overview has been presented here. It is however unlikely that private players alone are capable and willing to build up and provide such functions at their expense. That is why for a sustainable and inclusive market to emerge, public and private institutions as well as various forms of cooperation (i.e. public-private partnerships) are necessary in order that people at the BoP can in their favor participate.

4.3 Sustainability of Market Systems

Meaningful development is more than "*delivering a one-time success, but making lasting change in developing countries is what differentiates long-term development from short term relief measures*" (SDC 2008a, p.30). Sustainability in the context of a specific market can be read as: „*the market system's capability to ensure that relevant, differentiated goods and services continue to be produced [, delivered] and/or consumed by poor people beyond the period of intervention*" (SDC 2008c, p.33). Therefore it has to be considered who will do and who will pay for necessary functions in the future. This requires that realistic scenarios are developed not only at the end of a market creation project, but at the beginning of it. Sustainability must be planned at "*entry rather than at exit*" (SDC 2008a, p.30).

To sustainably disseminate a productivity enhancing, affordable product or service in any country, strong, growing and continuing demand has to be generated as well as an effective and reliable supply chain built up. The secret behind a sustainable supply chain is quite obvious: it has to be profitable for all stakeholders in the chain to deal with the good in order that out of their own interest they continue to produce, deliver and consume it. In order to create sustaining strong demand, affordable products aimed at BoP customers must be sold cheap and thus margins kept low. As these low margins initially only allow for small profits, the overall volume of the market has to be sizeable enough in order to justify the cost of developing the market. In addition it is of utmost importance to create as quickly as possible high enough sale turnovers of a specific good or service with the help of an effective marketing strategy.

For a public institution that wants to sustainably intervene in or create a market clearly priority has to be given to developing capacity; that is developing the necessary means by which specific goods and services and respective benefits continue to flow, rather than simply delivering benefits directly (SDC 2008a, p.30). A market facilitator in case of low-cost drip irrigation technology therefore assumes the role of helping private plastic producers, wholesalers and retailers to guarantee and improve quality and business practices and of developing marketing and supply networks all over the targeted region. Ultimately the aim is that all stakeholders become independent and self-reliant (Mehta 2004, p.14).

A market facilitator in consequence should not intervene into the core activities of supply and

demand and thus possibly risk to create market distortions, e.g. by permanently subsidizing the price of a good or service. Rather in order to create a sustainable market, interventions by a facilitator must mainly be focused on the context, that is on rules and norms as well as on supporting functions. In case subsidies are needed to encourage demand or facilitate the creation of a market, they have to be differentiated between short term temporary subsidies and longer term recurrent subsidies. In the latter case solutions have to be found how such recurrent expenditure, e.g. for promotional activities will be financed once support ceases (SDC 2008a, p.32).

IDE in India for instance in order to sustainably disseminate treadle pumps moved through four stages to eventually deliver market independence for all stakeholders involved in the supply chain. These stages are summarized in Figure 4 adopted from Roda Mehta (2004, p.28).

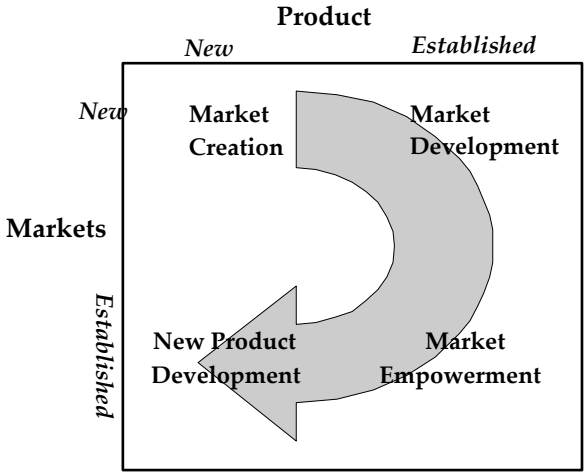

Figure 4: Stages to Create a Sustainable Market (adopted from Mehta 2004, p.28)

Initially at the market creation stage IDE establishes commercial marketing channels from the production of treadle pumps, to various distribution channels, to the installation of the pumps on farmer's fields to ensure availability and service of the product at village level. This includes tasks such as identification and motivation of manufacturers to fabricate the pump, establishment of a network of distributors and dealers, training of mechanics at village level that assure correct installation and possibly repair and partnerships with like-minded NGOs and commercial institutions to support generally the creation of the market. The goal is to make the supply chain viable so that as long as there is demand, there will be a channel to supply the pump.

Second at the market development stage, IDE invests considerable time and money into promotional activities. Here it is important to have an effective marketing strategy including for instance creating a strong brand with which farmers can identify. The goal is to build consumer pull.

At the market empowerment stage IDE tries to prepare all commercial stakeholders in the supply chain for the withdrawal of IDE and its funding. This stage poses the biggest challenge regarding sustainability. IDE's withdrawal is gradual and the timing depends on data collected about market penetration. If a large number of customer-farmers is arrived at, stakeholders in the supply

chain will accept the need to become proactive themselves. They will be responsible for product marketing and delivery and IDE tries to bring down its own share in the promotion costs to zero. Also at this stage a farmer by exercising his purchasing power will experience a sense of control and an ongoing demand for the treadle pump will ensure its continuing availability.

Eventually at the new product development stage IDE has withdrawn from the treadle pump operations, but continues to maintain its regional operation with a new product focus. This allows IDE effectively monitoring and responding to unwanted developments in treadle pump activities while at the same time following its own future strategic plan. IDE's activities now include looking at new technological innovations and inventions from across the world that can be modified in such a way to be affordable and thus to further benefit smallholding farmers that already use a treadle pump. Low-cost drip irrigation technology for instance is such an innovation. These new products then will feed again the commercial channels built up for the pump with new opportunities for all stakeholders to serve the already existing target customers and thereby to grow (Mehta 2004, p.28ff).

It is essential to define a large enough timeline for a market creation program that wants to become sustainable. Such programs tend to start small and take time to build momentum. It is thus very likely that program expenditures ramp up after the first years as the program moves beyond initial interventions to expand the scale and scope of their interventions (SDC 2008c, p.5). Also IDE India builds into every market creation project review and revision methods as well as the option of an organized abandonment of a project in case sufficient successes do not materialize quickly enough. In general for IDE, every project is planned to and should become self-sustaining within five years (Mehta 2004, p.33).

4.4 The Facilitating Role of External Agencies

External agencies creating or intervening in a market should only play a facilitating role. Facilitators should stand outside of the core of supply and demand of a market, yet work together with various actors within the market system in order to make it work more effectively. Ownership should thus generally lie with market players so that they have the financial resources as well as incentives to continue after the period of intervention has ended. The essential role of facilitators therefore is catalytic, to enable others rather than to do themselves. The goal is to stimulate changes in a market system without becoming part of it in order that in the longer term these changes become sustainable (SDC 2008a, p.32).

In practice the facilitating role may involve many different tasks, depending on the nature of the market and specific constraints to be addressed. In the case of introducing a new product such as low-cost drip technology interventions should certainly only be a temporary task. Therefore facilitators need to transparently and realistically consider the role and capacities of different market

players presently and in the future and accordingly chose the partners they want to work with.

The following list summarizes necessary principles and characteristics for a facilitating agency in order to successfully, that is sustainably implement market creation programs:

- *Closeness*: Agencies should know and understand the role of market actors in a given country without being captured by narrow private aims and lose sight of the public objective of creating the market. This also means that activity should be spread and an agency should not "*put all the eggs in one basket*". Closeness also allows playing a catalytic role; that is to start small and see what works to achieve scale and sustainability with the actors and means that are already in place and active in a region. (SDC 2008c, p.4)
- *Knowledge and insight*: Facilitating agencies should know enough about the specific product and the context it acts in to be able to analyze a market system and assess opportunities to intervene and add value. (Ibid.) For instance in the case of Kyrgyzstan this means following up the option of importing Chinese know-how and Chinese made low-cost drip systems.
- *Entrepreneurial instinct*: This certainly depends strongly on knowledge and allows seeing where opportunities lie and make accordingly different offers to different market players. Facilitating agencies should be capable of dealing with diversity, dynamism and risk, since some degree of failure has to be expected (Ibid.). In the case of creating a market for drip systems for instance if several actors are interested in becoming a wholesaler, this means that commercial instruments such as a public call for tenders can be used to determine which institution should play this role.
- *Independence*: This allows a facilitator not only playing an adapting and flexible role regarding a changing context, but also gaining respect and credibility from various market players. The independence of a facilitator has to be understood and accepted by all market players. Relationships between facilitators and market players for instance should be based around quid pro quo exchanges rather than unconditional giving. If then a market player does not perform in a satisfactory way, the facilitator can look for other more effective relationships. (Ibid.)
- *Allow crowding in and partnerships*: Crowding in differentiates facilitators especially from commercial players in a market system. Commercial players want to develop and exploit the market for themselves and essentially want to keep out others who do not contribute to or even threaten their (mainly) financial interests. A facilitator in contrast wishes to bring in other actors that contribute to the overall efficiency of a market system, so that it becomes both more inclusive and competitive (Ibid.). In this

regard cooperation with multiple players including agricultural research institutes, local government authorities, NGOs, financial institutions, civil communities or private companies might help in developing a market by for instance promoting a product, providing credit to poor customers or having additional staff informed and trained at field level.

- *Appropriately funded*: Resource levels for interventions and to create a market should be appropriate. This means they have to be sufficiently high to make a difference, but not to the extent that they cause negative distortions in a market system. In practice naturally this balance is difficult to define and depends on an in-depth understanding of the specific context.

(SDC 2008a/c, p.43ff/p.46)

5 Marketing at the BoP

The market creation approach analyzed in this thesis supports interventions that help private, commercial actors to reduce the costs and the time until profits can be made for products with benefits that are in the public interest, i.e. that help people at the BoP. In the specific case of this master thesis the product to market is affordable drip irrigation technology and the target group are smallholding farmers in developing countries. Once again it has to be stressed that building an efficient and sustainable supply chain does not aim at delivering a product directly for one time, but aims at building up long term reliable supply channels capable of serving an existing and growing demand.

Market creation and supply chain development in general have a lot to do with marketing and thus selected marketing concepts and specific marketing strategies are presented here. These concepts are necessary to understand product introduction strategies as to necessary investments, benefit expectations as well as regarding ways how to create enough demand and customer pull for a specific product as quickly as possible. Supply-chain management moreover is first and foremost customer orientated, so the need of building a supply-chain and making it work depends first of all on the demand and needs of the ultimate customer. This demand needs to be created with an effective marketing strategy in cooperation with adequate partners. The following market creation and marketing concepts will therefore specifically be presented in Chapter Five:

- *The product cycle curve* helps understanding how a market creation approach works over time as to sales, profits, numbers of stakeholders joining as well as to poverty alleviation effects.
- *Market segmentation* allows adopting marketing strategies to different customer segments. This is essential since for instance farmers belonging to different customer segments with different socio-economic backgrounds will buy low-cost drip

technology at different levels of the market creation process.

- *Product marketing* eventually helps creating sufficient customer pull in order that along the whole chain sufficient financial benefits can be made as quickly as possible with the ultimate goal to make the whole chain independent of any external support. The well-established concept of the four Ps (Product, Price, Placement and Promotion) provides the necessary guidelines at different moments of a market creation process.

5.1 The Product Cycle Curve

First of all it is important to understand how a market creation approach for a productivity enhancing good works over time in relation to sales, profits, number of enterprises joining the supply chain and the respective poverty alleviation impact. Figure 5 adopted from Heierli and Katz (2007, p.31) shows the product cycle curve which describes in a general manner different phases in a market creation approach for a new product. The basic elements of this concept are the sales and the profit and loss curve over time. Moreover the graph shows the development of the supply chain as to number of units joining and the effects on poverty reduction. The product cycle consists of four phases.

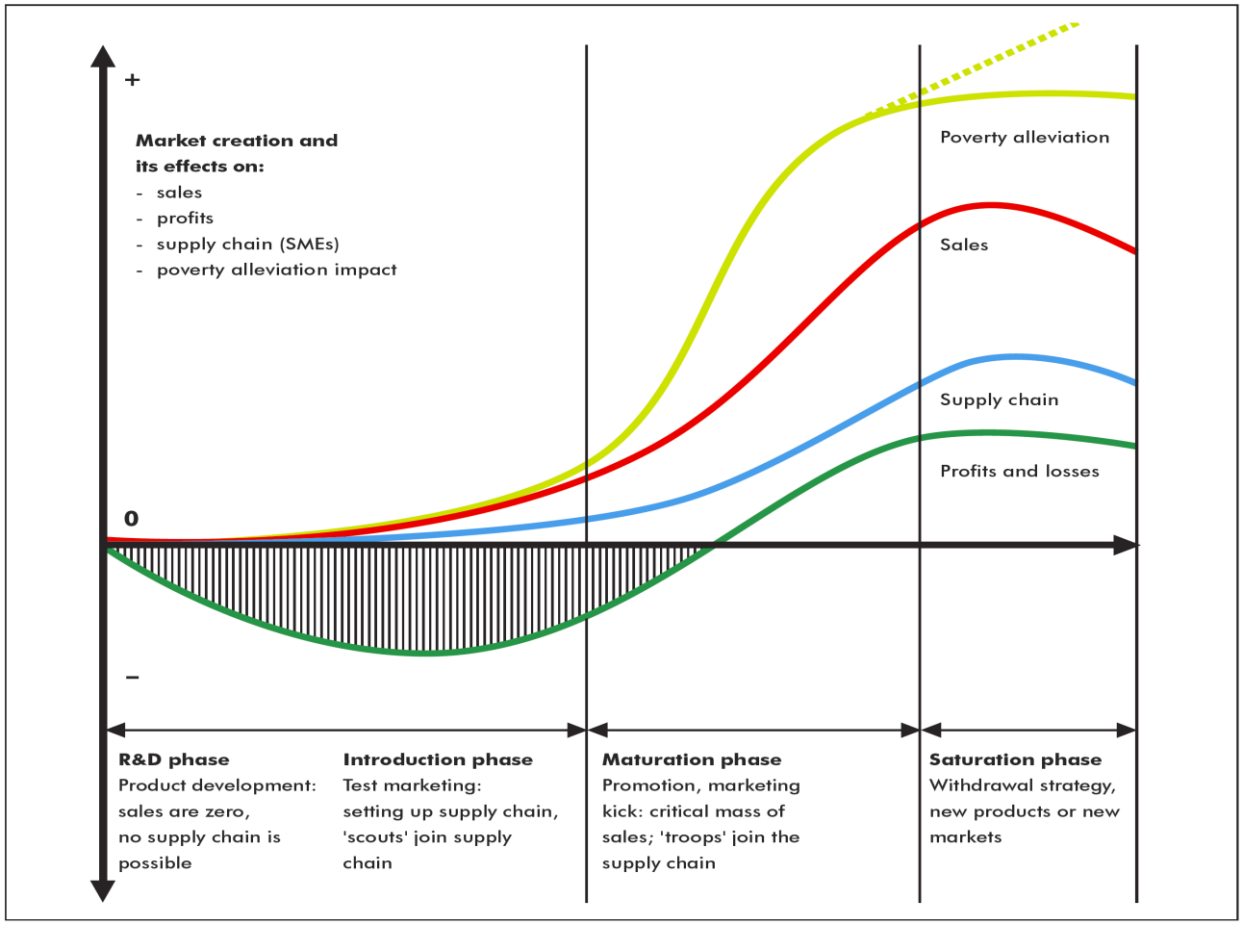

Figure 5: Product Cycle Curve (adopted from Heierli and Katz 2007, p.31)

In the *R&D phase* sales are zero and only prototypes are produced and start being thoroughly

tested in a specific region. There are only expenditures and no sales. In this phase the private sector only invests under the assumption that these expenditures can be recovered later. Since this is often not the case with products that are beneficial for people at the BoP, the private sector does very likely not invest. In consequence facilitating agencies need to step in and finance these initial tasks.

In the *introduction phase* the product is test marketed, so the first customers and the first sellers come in and the supply chain starts to develop. Those who are willing to buy and those who are willing to sell a new product are typically innovators. The innovators on both sides of the supply chain are risk-takers, enterprising people, rather better-off, unlike the poorest who are and have to be much more cautious and conservative. This phase needs extensive demonstration and testing efforts, and also promotion activities of the new product to create interest on the demand's side, as well as to motivate supply chain actors to enter the business. Sales volumes are low, there are still no profits to be made and thus facilitating agencies continue being active in manifold ways.

In the *maturation phase* mainstream customers are targeted with a respective marketing campaign, sales are supposed to pick up and profit is increasingly made. More actors in the supply chain see the potential of the product and join in. Promotion makes the product popular and the higher the sale volumes, the more sellers want to join. In particular in the reality of developing countries and for easy to make products, copy-cats will probably appear offering a very similar product, however usually cheaper since they do not need to recover the R&D and promotion costs. Facilitating agencies in this phase can start implementing their pulling-out strategy, retrieving support funds.

In the *saturation phase* a wide part of the potential customers are served and the sales and the profit curves start to flatten or even decline. Supply chain actors in consequence will either have to come up with new products or move to other areas. From a development point of view, the poverty alleviation curve shows that the social impact of a market creation process for a productivity enhancing good such as drip technology is more sustainable than the sales. Poverty alleviation will continue even after the market is saturated and sales are decreasing, as drip irrigation is continued to be consumed and generates benefits for its users. If this phase is arrived at, a sustainable market has successfully been created and facilitating agencies are then able to cease supporting stakeholders in the chain. (Heierli and Katz 2007, p.30ff)

Naturally the product cycle curve represents a model case which in reality unlikely materializes in the exact same way. Market creation approaches and a respective product cycle curves are rather dynamic and prone to various modifications, set-backs or even failures. The concept presented however is a useful benchmarking tool to guide and analyze ongoing market creation programs and respective marketing strategies.

5.2 Market Segmentation

In a market creation approach for a specific good or service it is also important to analyze how a market and the targeted customers are segmented in order to understand the development of sales over time and to design effective marketing strategies. Potential customers are not identical and in consequence reaching different types of customers at different phases of a market creation process needs different strategies.

First the target customers for a new product have to be identified. IDE in India for instance defined the target customers for treadle pumps as "*small and marginal farm households owning less than one hectare of land, possibly owning no implements of production and probably selling their manual labor to others for survival. […] They live in remote villages, hence are not easily accessible. […] They are illiterate, hence not easily reachable [and] they are poor, hence not easily convertible*." (Mehta 2004, p.19)

According to marketing theory the decision to buy a product is not an individual decision, but is influenced by social peer groups. Each customer segment has a different peer group or reference person who influences them in whether or not they are going to purchase a product. Therefore for each customer segment and accordingly their peer group specific marketing strategies have to be developed. One has to be aware that, especially in a region where a new technology is up to present unknown, the first buyers will not be the poorest people and that an effective market creation strategy needs to first target better-off, more innovative and risk taking customers. Poor customers usually must have seen a product operating successfully with their neighbors before they risk buying and using it for themselves. Poor customers are always and need to be risk avoiding.

Figure 6 summarizes different customers segments on the horizontal and accordingly sales figures on the vertical axis in a market creation process over time. (Heierli and Katz 2007, p.32)

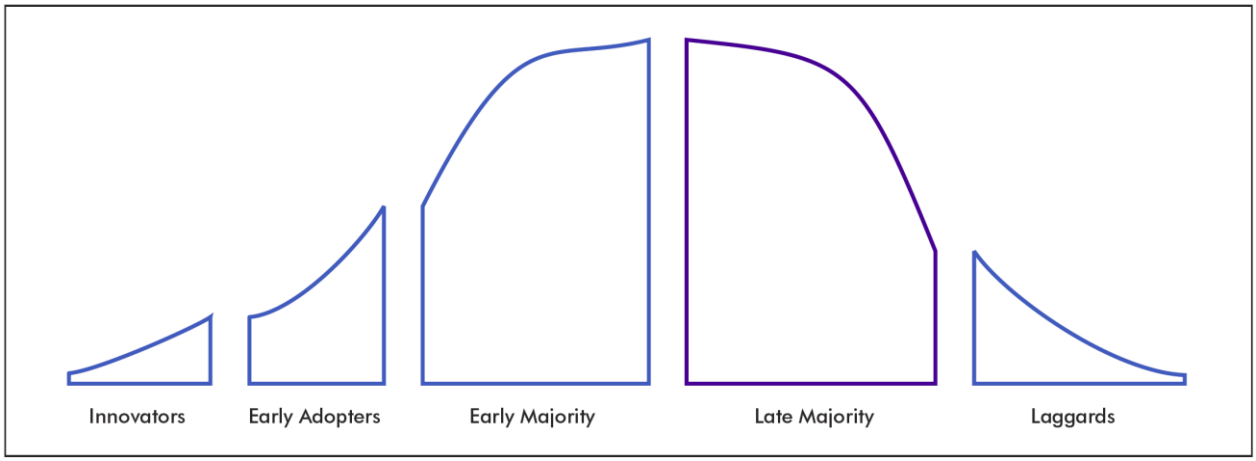

Figure 6: Market Segmentation (adopted from Heierli and Katz 2007, p.32)

Naturally defining who is who and who influences who can only be found through a solid market research and a sound understanding of the local context. Generally however five different customer segments can be identified: Innovators, early adopters, early majority, late majority and

laggards. Marketing strategies have to be adapted to these segments accordingly.

- *Innovators* in the case of drip technology are pioneer farmers who by themselves are looking for new products or services and want to try them out by themselves. They have a high level of curiosity and are capable and willing to take risks due to their somewhat higher socio-economic status.
- *Early adopters* in the case of drip technology are lead farmers who become interested in a new product once they have seen it working with an innovator. They may not look actively by themselves for new innovations, but may get aware through publicity or third parties that somebody else is successfully using a new technology. They have a high curiosity level as well and are prepared to take some risks. Their motto can be summarized as: "*If he can do it, I can do it as well*."
- *Early majority* farmers are those who have seen the technology working and would like to try it themselves given that it does not involve too much risk. They are more moderate in being curious and risk-taking. The early majority already needs to be actively convinced by somebody they trust. Their motto is more like: "*Show me a farmer whom I know and who has used it successfully.*"
- *Late majority* farmers tend to be poorer than the average and have less capacity to take risks. They are more skeptical, but do not need to be conservative people as such. Typically such farmers would ask: "*Can I be sure that somebody like me can use it without risk*?"
- *Laggards* are farmers who are for whatever reason averse to any risks and changes, also regarding the adoption of a new technology. Mainly their socio-economic status does simply not allow them taking any risks. If one considers only the sustainable development of a supply chain as main objective, laggards could be ignored since the effort to change their attitude is too big compared to possible economic returns.

(Ibid.)

From a poverty reduction point of view, a good marketing strategy to deal with the late majority and the laggards is actually the true development dimension of a market creation approach and requires patience. Farmers of the late majority and laggards are not simply conservative, stupid or lazy, but what is needed is a thorough understanding of the specific constraints they face, which can only be collected through a sound understanding of the local context and possibly through cooperation with local partners. It is important to understand who may influence the late majority and laggards in order to reach them. Usually late majority farmers need to see the technology working with other farmers who are like them. In this respect it has to be stressed that if market creation is left solely to the private sector efforts to reach the customer segments of the late majority and laggards

will most likely not be undertaken and poverty reduction goals in consequence remain unmatched. (Ibid., p.32ff)

5.3 Product Marketing

In a market creation approach for affordable drip irrigation technology a high volume of sales can only be achieved with an adequate product marketing strategy that stimulates demand based on a previously identified market potential. Naturally the hydrology of an area, i.e. a low water table, a deep aquifer and sparse and erratic rainfalls, has to support the potential use of drip technology. Thus an area where drip systems are successfully sold often offers only few alternate means of irrigation. The well-known four Ps of marketing (Product, Price, Placement and Promotion) give helpful guidance how to generate demand in an area where the overall potential for drip technology is high.

5.3.1 Product – Problem Identification, Product Design and Package Offering

As mentioned useful products that have a significant impact on poverty should be affordable and provide high returns on investments within a short period of time. IDE in India for instance tries to identify and design technologies that are able to provide a 100% return-on-investment within one year. To identify such products, problems and barriers people at the BoP face need to be determined and a product needs to offer a good solution for that kind of problem. The focus therefore lies on the discovery of the consumers' perception of the problem and to find out how important it is for the customer to find a solution for the problem (Weinreich 2006, online). In the case of drip irrigation for instance people at the BoP do not want a drip system itself, they want a reliable solution for irrigating their crops over the whole growing season. The product to be promoted in consequence is "*reliable irrigation*" and not "*drip irrigation equipment*" (Kotler and Armstrong 2006; Heierli and Katz 2007, p.38).

It is a mistake to position a product with a high "*development value*" specifically for the poor. Products even if they are explicitly designed for people at the BoP should look good and reliable. If this is not the case wealthier people may not want it because they think it is not meant for them. And if the rich do not want a product, then the risks is high that the poor do not want it either, because often their aspiration is to have the same products as the rich. Drip irrigation is typically a product for the rich and if it is made affordable it will also be attractive to the poor. Therefore from a marketing perspective in a country where drip technology is already known this product can be considered as ideal, since it can be marketed easily as a prestigious product made affordable to the poor. (Ibid., p.35)

Product quality needs to be guaranteed, but should not rise excessively the final price. As already mentioned many products are over-designed because they are designed for affluent markets (Tier One) with rigid quality standards and with a higher quality than poor people actually demand (Ibid., p.36). Quality should therefore be understood as a good cost-benefit ratio, good value for the money spent. In India for instance IDE as a facilitating agency plays a strong role during the process

of R&D and in its role as wholesaler and undertakes regular quality control inspections at production level.

Furthermore in order to convince farmers of the reliability of a drip system warranty should be given, not only to guarantee a farmer that in case something goes wrong with the product that it will be timely replaced and he does not risk to lose his harvest, but also if a farmer got a credit to buy the system, he can make sure that the system will work for the whole time he needs to pay back the credit. Warranty cards moreover allow collecting valuable market data necessary to observe a market creation process.

Since many especially smallholding famers generally lack knowledge about efficient and effective agricultural techniques and technologies, another strategy as to product marketing is to sell not only drip systems, but whole packages of agricultural inputs and services in which drip technology plays only one part. Buying such packages, possibly with the support of a microcredit institution, a farmer receives a guarantee that through his harvest he will be able to pay back the costs of it within a short period of time. This may further be ensured by the cooperation with (micro-) insurance companies in case of unforeseen events as droughts, floods or political turmoil. In Kyrgyzstan for instance there are various local agricultural extension services and commercial actors in place that hold enough agricultural know-how and are trusted by the farmers to offer such hard- and software packages.

5.3.2 Price - Profit Margins, Cost-Benefit Ratio, Price Differentiation and Discount Policies

Price policy is an important aspect of products and services targeted at the BoP and plays a crucial role in respective marketing strategies. Prices can either be too high that there are too little or no sales at all or prices can be too low so no profits can be made. Also if the price is too low or the product is even provided free of charge a consumer might assume that the product is low in quality or will not feel responsible for it.

Because people at the BoP have individually little money to spend, markets here do not allow for the traditional striving for high margins. Instead, profits are driven by volume. However when fixing a price the margins throughout the distribution system and the supply chain have to be adequate in order that a market and a respective supply chain become sustainable. IDE for instance in Bangladesh in the 1990s after starting the market creation process for treadle pumps learned that underpricing threatened the profits of stakeholders in the supply chain and thus the sustainability of the whole market became threatened as well. Hence later in India during the introduction phase IDE encouraged all stakeholders to take larger margins from the early stages of the program to guarantee adequate profits (Mehta 2004, p.16). An option for a facilitating agency in this regard is therefore not to predefine sales prices, but only to give recommendations and leave the final sales price decision up to the retailers.

The demand of products used by the poor is extremely price elastic, so a small price increase can reduce sales considerably. Rich people normally when buying a product will aim for longevity and top quality, which is not the solution for people at the BoP. For example if a poor family can either chose between a cheap product and a warm meal, or only buy a more expensive product and no meal, it is clear what they will go for. (Heierli and Katz 2007, p.36). Therefore trying to cut down the sales price of drip irrigation through all possible means is of utmost importance; this includes the reduction of transportation costs, the streamlining of the supply chain and possibly building up of cheaper local production capabilities. Price-elasticity also implies that quality, naturally connected to higher prices, is not a primary criterion for purchase decisions at the BoP. Poor people often have to go for lower quality at lower prices instead of long-lasting, high quality products. As mentioned however this does not at all mean that low priority should be given to quality, on the contrary people at the BoP deserve the best value for their money. Prahalad and Hart (2002, p.5) in this regard suggest that the price building process should be reversed. Instead of calculating costs and adding a margin, programs and commercial actors should rather start from the targeted sales price and recalculate costs accordingly.

Since low-cost drip systems assume cost leadership it must be aimed at an affordable design. There is the question however whether or not they will be perceived as inferior to other more expensive drip systems. After studying the situation in India and Kyrgyzstan it can be said that farmers will not perceive a cheaper irrigation system as inferior, if experiences with it are positive. Most important for them is the cost-benefit ratio. Naturally the perception of an adequate cost-benefit ratio not only varies between different countries, but also between different customer segments. In this regard price differentiation linked to product differentiation is a common strategy to meet the needs of different customer segments with differentiating cost-benefit aspirations. For example IDE in India and its commercial branch Global Easy Water Products Ltd. (GEWP) presently are offering three different qualities of laterals for their drip irrigation systems. The more expensive and stronger laterals may be preferred by better-off farmers, whereas the really poor ones go for the lowest-cost version. Also not only whole drip systems including all necessary components should be sold, but prices must be given for each individual part of a system, i.e. each piece of filter, of valve or micro tube, as well as each meter of lateral or main tube should have a price. Only in this way individual solutions for farmers with various plot shapes and cropping patterns can be offered and the corresponding prices calculated. Some farmers may even opt for only buying laterals and micro-tubes and build the remaining necessities themselves.

Another price related question is whether or not there should be a discount policy. A discount policy can be very effective in raising sale volumes and therefore discount policies for farmers as well as for retailers selling drip systems should be considered in any product marketing strategy at the BoP. However this does not mean that a facilitating agency should intervene in the core functions of supply

and demand in a specific market system by for instance heavily subsidizing products or services. Discount policies in contrast should rather concern price reductions for instance in case of high orders at retail level or at farm level concern discounts in case of successful word to mouth marketing.

IDE in India when promoting treadle pumps was often confronted with the charitable instinct of traditional aid agencies and associations. Several development organizations were simultaneously subsidizing the installation of various manual irrigation pumps by covering the cost of well drilling, or by contributing all or part of the cost of the pump. Their rationale for the subsidy was that small farmers were very poor, and paying the full price for a pump was a major hardship for them. The effect of the subsidy however was that it undercut the small entrepreneurs, who built, sold and installed pumps. If a development agency paid the cost of drilling and installing a well for one farmer, his neighbor would wait until he too could get his well installed free of charge, rather than pay a well driller a fair market price for his services. By bringing together the development organizations involved, a consensus was agreed on that all subsidies for the installation of manual irrigation pumps should be removed in order not to undercut local entrepreneurial activities. (Mehta 2004, p.22)

Last but not least agreements with different micro finance institutions are also noteworthy as to making drip technology affordable for any customer segment. A good strategy is to arrange deals with micro-finance institutions, so that farmers can pay back a credit within a short period of one to two years, once they already had successful harvests. Offering whole packages of not only drip hardware, but also other necessary agricultural inputs and know-how that make farmers more productive and pre-financing them with micro-credits also need to be considered in an effective product marketing strategy.

5.3.3 Placement - Dealer Network, Motivation and Local Production

Placement policy is to be understood as the analysis, planning, implementation and controlling of activities regarding production and product distribution summarized under a respective supply chain and distribution strategy (Kränzlin 2009, p.85). A typical supply chain for drip technology in any country may be formally depicted as in Figure 7, where the product flows from local or foreign production, to wholesaler, to retailer to the final customer and sales as well as other relevant information in the reverse direction. Placement policies therefore concern the location of production and distribution in order that convinced customers can buy drip technology and can obtain related services such as spare parts or advice on how to use it. In Kyrgyzstan for instance presently some farmers know about drip technology and would want to buy it, but there is just no adequate distribution system in place supplying them. Placement policy among other issues concerns this problem.

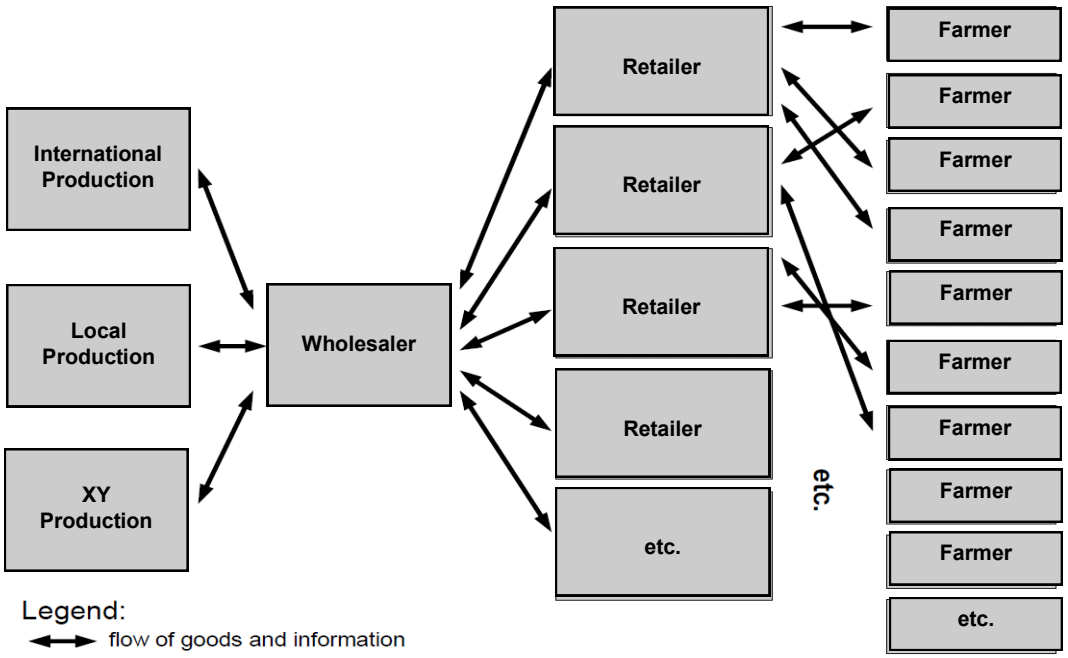

Figure 7: Typical Supply Chain for any Country

In order to supply people at the BoP with a new technology it has to be considered that poor rural customers are usually not very mobile and thus a sales place as close to them as possible is desirable. However, if the place is too remote or there are too many sales points, the turnover may be too low for a profitable business (Heierli and Katz 2007, p.38). In the case of Kyrgyzstan where population density is low and commercial activities are concentrated in the bigger cities in each administrative province, primarily in such places the availability of drip systems and spare parts needs to be guaranteed. Only there high enough sales-turnovers can be ensured and also poorer people living in remote areas come here on a regular basis. An adequately sized and efficient warehouse system and providing at least bigger central retailers with some systems up front which they are able to sell ex stock is thus necessary. Also offering drip systems in central places decreases the need for intermediaries and thus does not add additional margins to the final price.

However placement means more than just "*where to buy*"; a dynamic supply chain is also a place of action. Good wholesalers and retailers do not sit on the goods and wait until someone comes to buy. If it is profitable, they actively search for new customers or products and promote the products and services they offer by themselves. For instance they try to impress customers with all sorts of services, explain how a technology works, troubleshoot, arrange spare parts and give credit. Even though such additional services seem small, they can make a big difference to the final customer (Ibid., p.36). Moreover offering a whole package of hard- and software to a farmer at one place (concept of one-stop-shopping) regarding drip technology specifically, but also agricultural technologies and techniques in general will considerably improve customer service and convenience.

A well-functioning supply chain with a respective retail network is a very precious asset for

any company, since eventually it is the retailers who convince farmers to buy this or another product. In India for instance IDE trains the retailers in the use of drip technology and conducts, if necessary, additional sales training and motivational programs. Only if retailers are convinced of the benefits of drip technology, they will be able to successfully persuade farmers to start using it. Nevertheless the best incentives for wholesalers and retailers are financial benefits they receive when selling drip systems. And this is only possible if the product offers the best cost-benefit ratio possible.

Primarily wholesalers and retailers are commercial shops, but may also be cooperatives, NGOs, agricultural extension service providers or private people considering it profitable to sell affordable drip technology. A possible retailer should be well integrated in the local context, should know the customer-farmers, be trusted by them and must know the agricultural conditions farmers are working in. Furthermore it has to be guaranteed that all wholesale and retail partners have enough marketing know-how and commercial experiences that they are able to raise as quickly as possible their sales figures, especially at the initial stages of a market creation process. Preferably already existing actors should be included in the supply chain, since building up new promising retailers is very time and money-intensive. Also the sales area in a specific country can be increased by acquiring already existing retailers in new places where drip technology might be beneficial for farmers. In India IDE works together with various partners and coordinates the activities of all actors that are working to disseminate drip technology. This coordination effort includes the discussion of common issues, the joint development and production of promotional material and the setting up of a credit program. IDE also works together with local NGOs to promote and in some cases to distribute drip systems, since interested and active NGOs provide an excellent network for awareness generation, distribution, sales, credit through self-help groups, product installation and after-sales services. However IDE put checkpoints along the way to determine which NGOs are worth supporting (Mehta 2004, p.17).

Only if sales turnovers are high enough to cover the fixed and variable costs of all stakeholders a newly created supply chain will become sustainable. Wholesalers and retailers should be financially strong enough to pay for initial inventories, but not so well off that sales of a small item would have little economic significance to them. In this regard it has to be stressed that potential actors in the supply chain for drip should not be too small, but sell a broader array of products or services, e.g. agro-inputs or agricultural advice, to be economically viable, since specializing in one or only a few products for people at the BoP may not bring adequate profits. Moreover the option of offering different drip systems of different quality and life span should be considered. NGOs and agricultural extension service providers however are often supported by donor money, which covers their fixed costs and thus allows them concentrating on specific products and customer segments, irrespective of financial concerns.

The frontline staff of retailers and wholesalers is also crucial for an effective supply chain and

eventually for a successful market creation program. Already in the beginning it depends primarily on them to generate the sales aimed at creating a big enough demand in a specific area and by installing drip irrigation systems in the field they form the final link in the delivery chain. In addition to the installation, the field staff is supposed to provide a continuing repair and maintenance service to farmers to keep the sold systems working. Field staff thus needs to be trained to be technically competent in the installation of drip irrigation and maintenance as well as in marketing and selling techniques.

Furthermore the local cultural context in a specific country needs to be considered in an appropriate product placement strategy. In Kyrgyzstan for instance due to the actual ethnic-cultural conflicts between Kyrgyz and Uzbek communities it has to be ensured that the supply chain reaches both communities and farmers, i.e. Uzbek and Kyrgyz retailers have to be established.

Last but not least there is the question of either local production and procuring or importation. It is possible to produce low-cost drip systems in relatively small factories through simple plastic extrusion and moulding processes. Local production is thus usually possible and may decrease considerably purchasing prices, since transportation and importation costs can be saved. However this is usually only profitable once certain sales volumes have been reached. Building up local production needs considerable up front investments, e.g. for transaction costs, moral hazard and the production of the necessary moulds and dyes for extrusion and moulding. Initially for a small country with low sales volumes it may in consequence be more profitable to import drip systems. Nevertheless importation also offers different options where to source and for instance for Kyrgyzstan neighboring China, importation of Chinese made drip systems is certainly a viable option. In the longer run as soon as there is a substantial demand for drip, local production of at least part of a drip system can be initiated, also in order to further stimulate the local economy. IDE in India works with a number of small-scale enterprises, which developed their own production capacities for low-cost drip technology as demand grew. This not only increases product availability, but also generates some competition to keep the price low, while holding quality.

Regarding the appropriate size of local manufacturers it is not evident why cooperation with small and medium enterprises (SME) should be aimed at. Beck et al. (2005, p.199) for instance found no evidence that SMEs alleviate poverty or decrease income inequality more effectively compared to bigger, even multinational companies. When considering different placement strategies there is in consequence no reason that market creation programs should artificially promote one size firm versus a different size firm.

5.3.4 Promotion - Changing Buying Behavior, Efficiency Concerns and Branding

"*Promotion consists of the integrated use of advertising, public relations, promotions, media advocacy, personal selling and entertainment vehicles*" (Weinreich 2006, online). Promotion ultimately is aimed at

stimulating demand, i.e. changing the buying behavior of customers. But promotion is costly and resources are easily wasted if it does not reach its target audience and if it does not lead to increased sales within a reasonable time (Heierli and Katz 2007, p.38). Also usually public and private funds to create a market are limited and financial resources for promotion must be used as efficiently as possible on materials and activities that promise the highest effect in a given context.

Everett Roger's "*innovation diffusion process*" defines the mental process an individual goes through from the time he first hears about an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation and use of the new idea, and to confirmation of this decision. According to empirical observations, adopters of new products move through the five stages summarized in Table 2 (Everett 2003, p.20). The innovation diffusion process and thus the buying process of a specific farmer in the case of drip technology starts with the farmer recognizing a problem or need, e.g. hunger or the lack of income and/or his desire to grow more crops during the time when his plot of land is dry. This desire has to reach a threshold level so that a farmer is inclined to any information on irrigation options. Depending on the urgency of his problem, he will either be more receptive to information specifically about drip irrigation or he will actively search for information from various sources such as family, friends or neighbors, advertisements, demonstrations, sales staff, dealers, public forums (farmer meetings and trainings) or current users of drip irrigation, etc.

Creating a strong brand in this regard facilitates the spread of knowledge about a specific product and of a positive image of the product with which farmers can identify. In India in order to interest and convince farmers of the benefits of drip irrigation all promotional activities of IDE and its partners focus on creating maximum awareness of IDE's own brand "*Krishak Bandhu*" (Hindi for "*farmer's friend*").

1. Knowledge	An individual learns of the innovation's existence and gains some understanding of how it functions.
2. Persuasion	An individual forms a favorable or unfavorable attitude towards the innovation.
3. Decision	An individual engages in activities that lead to a choice to adopt or reject an innovation.
4. Implementation	An individual puts an innovation into use.
5. Confirmation	An individual seeks reinforcement of an innovation-decision, but may also reverse his/her previous decision if exposed to conflicting messages about the innovation.

Table 2: The Five Stages of the Innovation Diffusion Process (adopted from Everett 2003, p.20)

To make a rational purchasing decision, the farmer evaluates the benefits of drip irrigation in

solving his problem and forms preferences among different offerings or brands. He may also form a decision to buy the preferred option based upon the attitude of others about his intention, particularly those he respects or is close to or based upon some other unanticipated situational factors, e.g. a sudden social obligation arising from death in the family or some other purchase becoming more urgent. Complex and expensive purchases are likely to involve more buyer deliberation than simple and cheap ones. Having bought drip irrigation, the farmer then puts the system in use and may experience some level of satisfaction or dissatisfaction. Hence the role of the seller of drip does not end once the drip irrigation system has been purchased. The post-purchase use of the product and the farmer's level of satisfaction about its performance and quality are important to monitor in order not only to gain valuable inputs for future innovations, but also to assist a farmer in case he experiences problems with the use of it (Mehta 2004, p.27). In short during all levels of the innovation diffusion process efforts must be focused on customer satisfaction. And branding allows a farmer relating his satisfaction with a specific brand and not with the technology in general.

As seen in Chapter 5.2 *"Market Segmentation"* within the overall target group for drip irrigation there are persons who differ in the amount of elapsed time between their exposure to a new product and their buying and trying it and the group of early adopters for instance share some characteristics that differentiate them from late adopters. Bigger farmers are likely to be early adopters of affordable drip technology as the risk of purchasing is relatively low as compared to the cost of other technical irrigation methods. Their purchase is important for the adoption of drip irrigation in a given area as they set an example, often play the role of opinion leaders and spread necessary word of mouth to influence more risk-averse small and marginal farmers. For poorer smallholding famers on the contrary the purchasing of a new technology such as drip irrigation, involves a great cost and risk and hence understanding their information gathering and evaluation behavior is important in order to be able to develop strategies that assist a poor person in his decision to purchase a good.

Farmers may be reached via different people and institutions. These include NGOs, agricultural extension service providers and cooperatives that can play a vital role in organizing demonstrational plots, field days and trainings where low-cost drip systems and their advantages are presented. Since such organizations usually are well integrated into the local context and farmers know them, their advice is being trusted. They can also identify potentially innovative and risk taking farmers. But also commercial shops must be included in promotional activities, since they will mainly be the ones responsible for promotion of a specific brand they sell once agency funds are pulled out and often sell complementary goods such as greenhouses or liquid fertilizers to farmers as well.

Possible promotional activities for low-cost DIS can be grouped into two categories:

- *Static promotion*: leaflet, wall painting, dealer signboards, caps, t-shirts, fixed demonstrations, banners, posters, radio, TV messages

- *Dynamic promotion:* personal selling, opinion leaders, mobile demonstrations, farmer meetings, video van shows, village theaters, short campaigns, farmer field days.

(Heierli and Katz 2007, p.39)

In Bangladesh the assessment of different promotional activities clearly showed that dynamic promotion means are more effective than static ones, especially at the beginning of a market creation process. Mass media promotion may play an important role, but not at an early stage of the market creation process (Mehta 2004, p.77ff). In India rural areas are characterized by the absence of mass media and in such conditions information and knowledge about a new technology and different brands is primarily by word of mouth. Also demonstrations and testing opportunities are important promotional activities, since especially rural customers need to see what they intend to buy and farmers in particular want to touch it, feel it and try it out before buying. Moreover often farmers want to see experiences of other farmers using drip before they are willing to take a chance on it.

Once a critical mass of drip irrigation systems have been sold in a given area, enough people are neighbors and relatives of enough drip system owners to receive what they consider to be reliable information about its economic and technical performance (Heierli and Katz 2007, p.39).

The cooperation with large private companies might give an extra boost to the sales of a specific brand. In Bangladesh for instance in the case of the treadle pumps IDE worked together with The Bangladesh Tobacco Company Ltd. that offered the pump free of charge to its contract farmers and recovered its costs with tobacco purchases (Mehta 2004, p.13). Also influencing policy at government levels is an option to support affordable, income generating, appropriate technologies such as low-cost drip technology as long as there is no risk of market distortions and effective state institutions are actually around.

5.4 Financing a Marketing Strategy - Market Penetration and Pulling-Out Strategy

An effective marketing strategy for low-cost drip technology requires adequate funding and due to sustainability concerns it is certainly of importance to have a strategic concept how to include and confer the costs for marketing and promotion to the (commercial) stakeholders in the supply chain in the medium and long term when the financing of a facilitating agency pulls out.

As mentioned in the initial stages of a market creation approach there is a clear case to use public funds for promotional activities and materials. In Kyrgyzstan for instance drip technology up to present is almost inexistent and no private actors are willing and able to finance the costs required to build up sufficient demand from close to zero. In the short term therefore agencies and public funds need to step in and invest funds for promotion that are very likely not recoverable because including them in the purchasing price would increase it too much.

Since in a market creation process promotional activities serve two purposes, creating

awareness of a new product in general and creating awareness for a specific provider of this product, a balance of support has to be found however. If a promotional campaign is focused too much on a specific (private) provider of a product benefits can be captured by him at the expense of the more important overall market. However, there must be enough benefits of a marketing campaign for commercial and other stakeholders in the supply chain (SDC 2008c, p.118). In any case in the long run private stakeholders will have to take on the financial responsibility of promotion and include the costs in the margin on sales. Here branding and a noticeable brand image of a drip system allow that actors along the supply chain especially at wholesale level identify with a specific product and are more likely to promote it with their own resources.

In order to avoid the danger of "*marketing as a black hole for resources with little feedback on their level of usefulness*", indicators need to be developed that assess the increase in demand and thus the effectiveness of the promotional strategy (Ibid., p.117). Every agency that implements a market creation approach thus must measure and forecast the size, growth and potential of the market it operates in as a means to guide all areas of its operation, including its promotional strategy. The identification of the *target market* for instance is such a measure. The target market for low-cost drip irrigation consists of all actual and potential buyers in a given area. From this emerges a *demand forecast*. The *potential market* consists of all farmers who have a sufficient level of interest and can access drip irrigation systems, while the *available market* is defined as the number of farmers who also have the capacity to pay for a system in that year. For this purpose a common set of criteria and weights is required for estimating potential customers versus the universe of all farmers. What also need to be collected are the sales of other producers of drip systems in order to get a realistic estimate of the total number of systems sold to the target group. Only once the estimate of the potential market of farmers and the sale of drip irrigation technology to this group has been arrived at, it is possible to derive both the market that already has adopted drip irrigation technology as well as the potential customers yet to be converted, which also allows controlling and possibly adapting the present marketing strategy (Mehta 2004, p.39ff).

Warranty cards especially are a rich source for market data collection because different information can be incorporated (e.g. size of landholding, place of residence, type of system) to help for instance identifying the type of farmer-customer who bought drip irrigation in the past month. Continually estimating the actual market penetration eventually allows defining a respective pull-out strategy for facilitating agencies and their funds, for instance once a certain threshold of market penetration has been reached. IDE in India also uses market penetration indicators and sales forecasts for its finance department to generate funds for investment and operations, for its quality assurance department to define necessary producer capacity and output levels and for the human resources and training department to hire and train the necessary number of staff (Ibid., p.39).

6 Overview of the Theory

In the Theory part in Chapter One it was shown that the concept of poverty is multidimensional related not only to economic indices such as income levels, but also to civil and political liberties. Nevertheless on a global level poverty numbers as to income levels remain high and the Bottom of the Pyramid presently still contains over two billion people living on less than US$ 2 (PPP) per day.

As seen in Chapter Two aggregate economic growth is certainly the most critical factor to fight the deplorable situation people at the BoP are living in, yet thinking that economic growth alone will solve the problem is too simple. In contrast, economic growth needs to be pro-poor which strongly depends on governance structures and on how much the poor are actually involved in economic activities. Expanded access for the poor to various markets is thus identified as a most critical factor in order to reduce poverty and well-functioning sustainable markets for everybody including the poor are also a precondition for aggregate economic growth. Development assistance in consequence must increasingly focus on changing markets in favor of the poor and make them more inclusive.

Chapter Three showed that the effectiveness of 60's efforts of the international aid system can be justifiably questioned and controversies as to central planning, tied aid, conditionality and incoherencies remain high. Moreover official and private development assistance must be put into perspective for instance regarding the amounts and effects of remittances sent home to developing countries by migrant workers. In the evolution of modern international development assistance different theoretical rationales were predominant at different moments, but market-based approaches for development allow effectively avoiding the most controversial issues of the past and present and certainly offer high potential in the fight against poverty if put into practice.

Chapter Four indicated that markets and respective market systems - consisting of not only formal rules and informal norms, but also of supporting functions - are too complex that neither the private nor the public sector alone can successfully intervene in favor of the poor. Both sectors need to cooperate in order to generate sustainable results. The focus must not be on one time direct delivery of productivity enhancing products and services to the poor, but on building up long-term reliable supply channels independent of any external financing and capable of serving an existing and growing demand. Market creation approaches support interventions in the developing world that help private, commercial actors to reduce the costs and the time until profits can be made for products that help the poor, but they must abstain from direct interventions into the core of supply and demand in a market that risk causing market distortions that are difficult or impossible to correct later on in the process.

Eventually in Chapter Five it is argued that market creation and supply chain development have a lot to do with marketing. Therefore specific marketing concepts and strategies were presented

not only to understand market creation programs as to necessary investments and benefit expectations, but also regarding ways how to create enough demand and customer pull as quickly as possible. Supply-chain building and management is first and foremost customer orientated, so it depends first of all on the demand and needs of the ultimate customer. And adequate demand needs to be created with an effective marketing strategy in cooperation with reliable partners. Marketing strategies need to be adopted for different customer segments with different socio-economic backgrounds that will buy productivity enhancing products and services at different levels of a market creation process. Product marketing eventually helps creating sufficient customer pull in order that along the whole chain enough financial benefits can be made as quickly as possible with the ultimate goal to make the whole chain independent of any external support.

Next, the practical section of this thesis will put the outlined rationales into effect for the specific case of Kyrgyzstan regarding affordable drip irrigation technology for smallholding farmers.

III PRACTICE

"I hate books about poverty that make you feel guilty, as well as dry, academic ones that put you to sleep. Working to alleviate poverty is a lively, exciting field capable of generating new hope and inspiration, not feelings of gloom and doom. Learning the truth about poverty generates disruptive innovations capable of enriching the lives of rich people even more than those of poor people."

Paul Polak (2008)

1 Context

This practical part is based on and summarizes the results of a three month internship for the NGOs International Development Enterprises (IDE) and Helvetas in Kyrgyzstan in spring 2011. In cooperation they act as market creation facilitators for affordable drip irrigation technology in Kyrgyzstan and possibly other Central Asian countries. The main task of the internship was the collection of data and identification of potential partners through meetings, interviews, fieldwork and background research with the goal to create a market for low-cost drip irrigation systems (DIS). The objective was to develop a market concept at all levels from plastic producer, to possible wholesalers, to various retailers and eventually to farmers for the creation of an independent supply chain.

Integral part for the realization of these tasks was empirical knowledge and experiences gathered during a three month internship for IDE in India in summer 2010. All of this empirical information is used here as a theory-confirming case study, where the concepts and rationales of the theoretical part will be put into practice, tested and possibly adapted and ameliorated according to the needs of the specific Kyrgyz context.

Drip technology of high and low-cost had been previously introduced in Kyrgyzstan by various programs and projects, private or public and showed persuasive results. Yet efforts were limited to demonstrational and/or technical purposes. Up to present no attempts were undertaken to solve the problem of reliable supply in case Kyrgyz farmers actually want to buy and permanently use drip technology. Farmers might have wanted to buy, but there was just no supply. Therefore in late 2010 IDE in cooperation with the "*Efficient Use of Water Project*" (SEP) of Helvetas imported a container from India with low-cost DIS of various sizes and for various crops and started to sell these systems in spring-summer 2011 in order to test the market potential at farm level and to initiate a market creation process. The imported Indian made systems are presently successfully sold in India, Central America, South and South-East Asia and various States in Eastern and Western Africa. Compared to conventional DIS they are easy to install and maintain and are designed in a way to reduce sales prices as much as possible, thus low-cost.

The Practice part in Chapter One first presents the Kyrgyz context. The country will be briefly

presented regarding its geographical and socio-economic situation. Drip irrigation technology in general is identified as a specific market constraint for smallholding farmers and its advantages outlined. Then an affordable form of drip technology is described, equal to the one imported from India. Chapter One closes with an analysis of the profitability of low-cost drip technology at farm level in Kyrgyzstan.

Chapter Two concerns the actual creation of a market for low-cost drip technology in Kyrgyzstan and possibly also other Central Asian countries. For this three main challenges have been identified: (1) the creation of a sustainable supply chain, (2) the spread of knowledge and promotion of low-cost drip technology and (3) the possibilities for local and/or Chinese production and procuring of the drip systems. Chapter Two thus identifies and presents solutions to successfully meet these challenges.

Eventually this practical part is concluded in Chapter Three by an outlook for Kyrgyzstan and other Central Asian countries where the main results and implications for the future of the market creation program of IDE and Helvetas are once again briefly presented and summarized.

1.1 Kyrgyzstan

Kyrgyzstan is a Central Asian, landlocked and mountainous country with an area of around 200'000 square km. 94% of Kyrgyzstan's area lies 1'000m above sea level and the climate is dry-continental. The country has a population of around 5.3 Mio and its capital and largest city is Bishkek (EBRD 2011, online). Kyrgyzstan gained independence in 1991, but started with a difficult heritage of an economic structure that entirely relied on the Soviet Union. The transformation from a centrally planned economy to a competitive market-economy caused immense social and economic challenges. At present the (official) unemployment rate is at around 20%. The politic and economic break after the state foundation in connection with increasing international competition led to social conflicts and regional disparities which brought a tense and instable political situation. Several governments have been overthrown and there were violent ethnic clashes between the Kyrgyz majority and the Uzbek minority; the last time in summer 2010. (GTZ 2011, online)

Kyrgyzstan has an economically dominant agricultural sector. Cotton, tobacco, wool, and meat are the main agricultural products, although only tobacco and cotton are exported in any quantity. Industrial exports include gold, mercury, uranium, natural gas, and electricity. Agriculture and industry both account for around 25% of GDP and services for around 50%. However almost 50% of the working force is employed in agriculture and only around 12% in the industrial sector. 40% of the population lives below the national poverty line and 29% below US$ 2 (PPP) per day (PRB 2011, online). In 2010 GDP per capita (PPP) is estimated at US$ 2'200 and inflation levels (at consumer prices) are high; in 2010 inflation was estimated at around 8% (The World Factbook 2011, online).

Figure 8: Map of Kyrgyzstan (The World Factbook 2011, online)

1.2 Drip Irrigation Technology - A Specific Market Constraint

Access to water is one of the keys to wealth or poverty. Scarcity of water is often directly related to poverty. Additionally for farmers access to irrigation water plays a major role in poverty alleviation by providing food security and expanded opportunities for generating income both on and off the farm. The development of irrigated agriculture has been a major engine for economic growth. In much of the world however regional and seasonal water scarcity is increasing. Many countries are entering an era of severe water shortage. Groundwater levels are declining and especially in arid and semi-arid regions of the world the point has been reached where over-exploitation of water resources not only poses a major threat to food security and respective livelihoods, but also is the cause of conflicts between individuals, villages or whole regions and countries (Barker et al. 2000, p.1/7). Kyrgyzstan in this regard is not an exception.

Generally at farm level the opportunity to earn money for a farmer and nourish his family depends on controllable factors - such as the quality of inputs, farm management strategies, cropping intensity, timing of cropping, market access opportunities and other value-addition at farm level - as well as on non-controllable factors - such as the quality of soil and the general plot situation, irrigation sources and climate conditions (Rajshekar and Ravi undated, p.9). Access to irrigation water in this regard is a non-controllable factor which however is most critical in order that a farmer can take up cultivation.

As Paul Polak (2008, 10) writes 75% of farmers in developing countries cultivate less than two hectares of land, survive on meager incomes, have often difficulties accessing water and a single disastrous crop failure could turn them into landless laborers, because they might have to sell their lands. Market-based development approaches need to focus on such farmers and enable them to increase their harvest and income by growing and selling high-value, labor intensive crops such as off-season fruits and vegetables as well as crops for food security such as rice, wheat or maize. The goal must be that farmers themselves can ensure food security and beyond produce an income generating

marketable surplus.

Smallholding farmers however need access to very cheap irrigation solutions, such as drip or sprinkler technologies, quality seeds and fertilizer as well as farm training for crop management and crop-portfolio planning. Naturally market access opportunities are equally critical in order that farmers can sell their crops at a profit. Low-cost drip technology in consequence concerns one point in this list of problems.

1.3 Advantages of Drip Irrigation Technology

Drip irrigation technology has various advantages not only regarding the efficient use of irrigation water, but also as to effective agricultural techniques. The following list presents and summarizes the main advantages, which collectively allow for the high poverty alleviation effect of the technology.

- *To conserve water*: Irrigating plots with drip technology, water savings of up to 90% can be achieved. Drip technology thus allows growing crops on fields where cultivation would not be possible due to water shortages.
- *To save energy*: Often irrigation water needs to be lifted from channels, wells, rivers, lakes by electric or diesel motor pumps. Using such lifted water more efficiently thus allows saving energy and respective costs.
- *To save fertilizers, herbicides, pesticides and fungicides*: With drip technology liquid fertilizers may be directly applied to the root zone of a plant, hence no fertilizer is wasted and lost in uncultivated parts of a plot. Also drip technology allows better controlling the overall humidity and wetness of a plot, which is often the cause of plant diseases, pests and fungal decay spreading quicker.
- *To increase yield and get higher quality crops*: Drip technology allows equally distributing irrigation water in a plot according to crop norms; the consequence are not only yield increases, but also higher quality crops that fetch higher prices.
- *To decrease work load*: Once a drip system is installed and fine-tuned, the work load in a plot decreases, since there is less weeding necessary and the whole irrigation process is less labor-intensive than for example irrigating by buckets or through furrows. Moreover using drip technology the soil gets less compacted and thus less ploughing is necessary.
- *To cultivate new plots*: Drip technology makes it possible to cultivate plots, which were not used before, for instance because water had to be carried by hand from far away.
- *To efficiently manage a plot:* Using drip technology farmers often change their attitude towards general plot management; they may start planning what crops to plant where and when, how much inputs are necessary and when to give, etc. This process very likely leads to yield

increases.

- *To avoid salting of soil:* Since when applying water drop by drop, the water gets immediately absorbed by the soil around the plant and most of the soil surface remains dry, there is less risk of salting of soil. In contrast to flood irrigation, where much water remains on the surface, evaporates and salinization of the soil risks making the plot unusable.
- *To avoid soil erosion:* Natural soil building is a very long process and soil replacement is costly and burdensome. With drip technology less soil erosion takes place. This is especially advantageous on steeper slopes, where the risk of erosion is high.

(Studer et al. 2004, p.26)

The totality of these positive features allows farmers using drip technology to greatly enhance their agricultural productivity. However up to present drip technology is characterized by high prices and thus not affordable for poorer smallholding farmers. The next chapter addresses this problem.

1.4 Affordable Drip Irrigation Technology

Low-cost forms of drip irrigation technology are already around and successfully in use under various climatic conditions in various countries for various crops. Nevertheless depending on the crops and the conditions in a specific region the technology might need to be adapted and the installation and operation of a drip system require some qualified explanations for the farmers to fully understand how to use it effectively. Once a system is installed the operation, however, is easy.

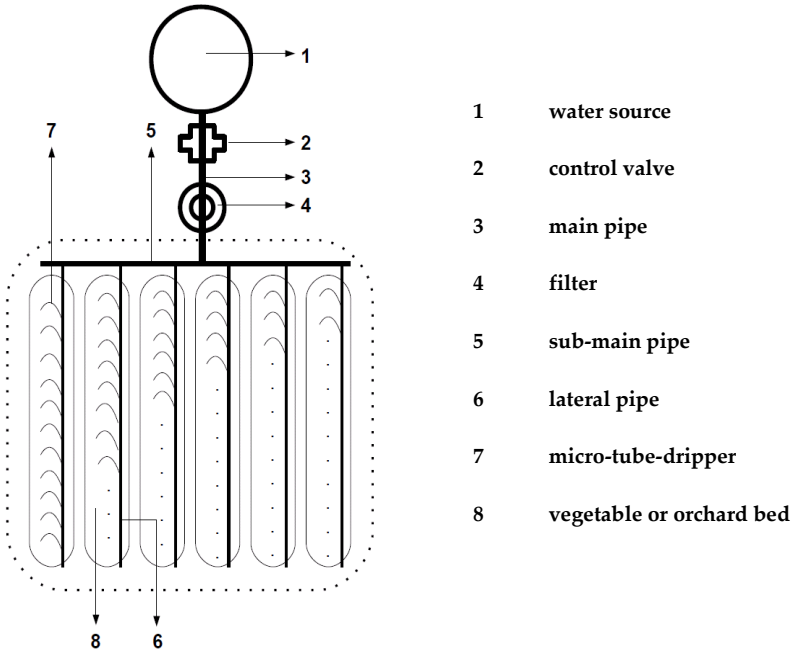

Figure 9: Components of a Low-cost Drip Irrigation System

A simple and affordable drip irrigation system (DIS) considerably differs from conventional high-cost drip technology especially as to its design. It is designed as cheap as possible, built with environmentally friendly plastics as far as possible, works without artificial pressure of electric or

diesel pumps, is easily expandable and may already be used for very small plots of around 20 square meters. Typically it consists of the components depicted in Figure 9. Most of the components can be easily manufactured through plastic injection molding or extrusion processes, which allows local manufacturing as soon as demand in a specific region takes off.

Since the drip irrigation system is a low-pressure system that uses gravity to increase water pressure, the *water source* in form of an overhead tank or reservoir must be placed at a minimum of one meter above ground level. Depending on the plot size and the frequency of refilling, the size and height of the water source need be adapted. Reservoirs can be of various shapes and be made of various materials (metallic or plastic). *Control valves or ball valves* in order to keep down the costs are entirely made of plastics and regulate the required pressure and flow of water into the system. Valves can be of various sizes depending on the size of the whole system. *Filters* ensure that only clean water enters the drip system and thereby the micro tube drippers do not get blocked. Different types and sizes of filters can be used from simple cheap tissue or plastic filters to more sophisticated, expensive metallic filters providing different flow rates depending on the size of the DIS. The *main pipe* and the *sub-main pipe* convey water from the source to the lateral pipes. Filters and ball valves are according to the needs of a plot installed in between. The size and the diameter of the main and sub-main pipe depend on the size of the whole drip system and respective necessary water flow rates. *Lateral pipes* are according to the spacing of the plant beds connected to the sub-main pipe at regular intervals, run along the plant beds and are channeling the water to the micro-tubes. *Micro-tube drippers* are straight or curled tubes with a very small inner diameter of around 1mm and a length of around 20cm. They are inserted according to plot and crop needs at regular intervals into the laterals. In order to guarantee equal flow rates the predefined diameter and length have to be absolutely adhered to, since the water discharge from the micro-tube is directly proportional to the operating pressure and inversely proportional to its length. There are various other pieces necessary in order to get a complete affordable DIS. They are similar to components needed for sanitary installations and therefore usually easily found on local markets. The low-cost DIS outlined here is one possible form of drip technology that allows reducing the final price and thus makes it affordable due to its design features. Naturally the design can vary depending on specific local agricultural conditions and needs and the capabilities of local plastic manufacturers.

1.5 Profitability of Low-cost Drip Technology at Farm Level in Kyrgyzstan

Kyrgyzstan is a country where water scarcity is acute in particular zones and during peak times and not always obvious at first glance. Water in many parts of Kyrgyzstan is considered a resource free of charge (gift of God), which is easily available and many farmers hold that only the irrigation infrastructure should be paid for. Therefore many farmers do not have much knowledge,

how to rightfully, efficiently and effectively irrigate their crops. They for instance lack knowledge about the irrigation norms of different crops. There are, however, also regions where water is only in limited amounts available or where it is very costly and burdensome to channel irrigation water to agricultural fields. Moreover, the irrigation infrastructure still originates from Soviet times and is mostly in a poor, run-down shape.

Well irrigated agricultural land in Kyrgyzstan is a limited resource. Out of the almost 20 million hectares of total area in Kyrgyzstan, 9 million hectares are mainly extensively used as meadows and pastures, and only 1.3 million hectares is arable land. 0.9 Million hectares are well irrigated, intensively used and therefore considered economically important (The World Factbook 2011, online). The main reasons for land not being plowed and intensively used are growing problems of access to irrigation water due to deepening groundwater tables, problems of salinization, soil erosion and uncontrolled urbanization. In consequence water already is and further will become a scarce resource in the country.

In 2009 a study of Agroline Ltd. showed that 65% of not cultivated, but arable land was not used due to lack of irrigation water (Agroline 2010, p.4). In the same study, containing 120 interviews with farmers in the south of Kyrgyzstan, it is indicated that an average household has a little more than one hectare of plowed soil, where cereals (~60%), cotton (~7%), tobacco (~3%), potato (~6%), vegetables (~4%) and fruits and berries (~5%) are cultivated. These lands are mainly irrigated by channels directing water from wells, which are usually located about 200 meters away from the plots. Nevertheless practically all respondents mentioned problems of water deficiency for irrigation, which is sometimes the cause for conflicts during the dry season and/or farmers have to grow low profitable crops which need less water. Moreover farmers have little knowledge about more efficient irrigation technologies and as a result there is a big interest to get information and consultation on accessible and efficient irrigation technologies, including low-cost DIS. Over 5% of the interviewed farmers were immediately ready to invest their finances in small low-cost DIS in order to try the technology. (Ibid., p.5ff)

In general at farm level in Kyrgyzstan drip technology can be used for the following purposes:

- Preservation of existing, mostly rain fed fruit orchards where due to various reasons water is getting scarce
- Exploitation and cultivation of new fields for fruit orchard or vegetable plantation which so far lied idle due to lack of water
- Augmentation of irrigation water efficiency on existing plots (fruits and vegetables) where it is burdensome and expensive to irrigate due to the geographical location
- Irrigation inside greenhouses

It has to be stressed that the imported Indian DIS are mainly foreseen for farmers marketing

their crops on regional, national or international markets and only secondary for subsistence agriculture and home gardening. This is especially true for the introduction phase of the market creation process. Once the technology starts successfully spreading however smallholding, poorer farmers will possibly also adopt it, e.g. for home kitchen farming in more remote areas. As to the potential of drip technology for the exploitation and cultivation of new fields for vegetable plantation it has to be emphasized that farmers presently cultivating and marketing vegetables are doing this in well irrigated areas where there is no lack of water. Thus drip technology first needs to be popularized and prove its practicability in general before even innovative, risk taking farmers will start using it for the cultivation of vegetables in so far uncultivated fields, where it is costly to channel irrigation water.

Regarding the costs of low-cost drip technology for farmers, it should not be neglected that its utilization requires additional expenses, for example for a water reservoir or the fencing of a plot. Also, the required labor input should be considered. In the beginning, operating a drip irrigation system needs a lot of attention and fine-tuning, especially for the presently imported systems, since they are less stable and not buried into the ground. Moreover shortage of labor is an important factor in agriculture in Kyrgyzstan, since many young men migrate to Russia and leave field work to elderly people, children and mostly women.

However, farmers that made experiences with Indian low-cost drip irrigation systems for tomato cultivation in 2009 expressed the following positive effects of the technology:

- Yield increase, 50-250%
- Saving of water, 250-600%
- Savings of labor, 600-800%
- Savings of fertilizers 200%
- Savings of electricity for water pump
- Less diseases and pests, i.e. savings of herbicides, pesticides and fungicides
- Higher market prize due to better crop quality around 15%

(ZOKI 2009, p.2ff)

The aggregate effect of these positive impacts will certainly make low-cost DIS profitable at farm level and can guarantee for high enough returns on investment in order to pay a DIS back within one to two years. Furthermore in the mid-term the accumulation of experiences collected on various plots with various crops will allow getting a more accurate picture about its profitability. Last but not least rising price levels for agricultural food products may speed up the process of introducing low-cost DIS in Kyrgyzstan by giving further economic incentives to farmers for example to open up and cultivate on plots that up to now lie fallow.

2 Creating a Market for Low-cost Drip Irrigation in Kyrgyzstan

Aiming at the goal to create a market in Kyrgyzstan and possibly other Central Asian countries three main challenges have been identified and are focused on here:

1. Creation of a sustainable supply chain for all stakeholders
2. Promotion and spread of knowledge about drip irrigation
3. Local or Chinese production/procuring of drip irrigation systems to allow competitive (low) manufacturing costs and reduce transportation costs

In order that a sustainable market can be created these three challenges require special attention and therefore surveys were carried out among stakeholders from different parts of the supply chain with the aim to identify solutions to successfully meet them.

First, the market creation program of Helvetas and IDE needs to identify and build up commercial channels through which drip technology is being produced, sold and delivered at present and in the mid-long term in a sustainable way, that there are benefits and financial incentives at each level of the supply and value chain, i.e. at the production, wholesale, retail and farm level.

Second, since drip technology is unknown to most Kyrgyz farmers, knowledge and advantages of the technology have to be first established and spread throughout the country with the help of an adequate promotional strategy.

And third, since importation costs for Indian systems are too high and delivery times long, the Helvetas-IDE project together with the private sector in the short- and mid-term must consider the option of (partial) local or Chinese production and/or procuring in order to be able to minimize purchasing prices and thus make drip available to each and every farmer segment.

Figure 10 shows a schematic diagram of a supply chain for DIS in Kyrgyzstan. Up to now the DIS were exclusively imported from the Indian based low-cost micro irrigation manufacturer Global Easy Water Products Ltd. (GEWP) and distributed in Kyrgyzstan through the agricultural extension service provider (AESP) "*Public Foundation Training, Advisory and Innovation Centre*" (ZOKI) as a wholesaler and through the partner NGOs of the SEP-project of Helvetas and some commercial retailers in Osh, Jalalabad and Batken province.

Chapter Two is structured according to these challenges. First the potential and opportunities for local and/or Chinese production and procuring of affordable DIS are analyzed and assessed. Then it is examined how to best organize the wholesale and retail in order that these important functions become sustainable and independent as quickly as possible. And last but not least possible promotional strategies and activities are identified that guarantee not only high efficiency regarding spent resources, but also offer the highest potential in order to quickly generate enough "*customer pull*" for low-cost DIS.

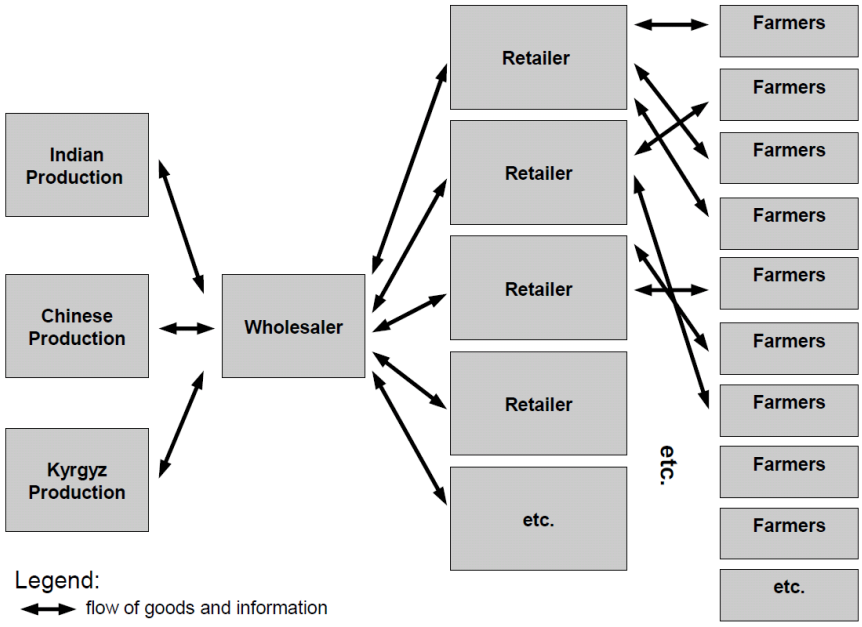

Figure 10: Schematic Diagram for a Supply Chain for DIS in Kyrgyzstan

2.1 Local or Chinese Production/Procuring of Drip Irrigation Systems

Since importation costs for Indian systems account for a high share of the final sales price (around 20%)[10] and importation takes up to three months after ordering, Helvetas-IDE project together with the private sector in the short- and mid-term must consider the option of (partial) local or Chinese production and/or procuring in order to be able to minimize purchasing prices and make drip available to each and every farmer segment. Moreover since the sale and after-sale services of Indian based GEWP leaves a lot to be desired (incomplete compliance to orders, missing parts, quality and warranty issues and inexistent after-sale services), local or Chinese production should be considered and initiated as soon as possible. Regarding sustainability and profitability concerns it has to be stressed that according to conducted interviews all stakeholders involved at production level will produce components or whole DIS purely on market terms for market prices; that is they will only produce DIS if it will be financially profitable for them.

Production of the Indian designed DIS is possible both in Kyrgyzstan and China at considerably lower costs of up to 40%. Moreover the option of importation of Chinese designed drip systems should be imperatively considered, since they are not only cheaper, but also of higher quality, which is especially necessary for orchard plantations under Kyrgyz conditions. Both injection molding and extrusion machinery can be found in Jalalabad and Bishkek and the necessary raw materials are available in Bishkek. It has to be kept in mind however that building up local or Chinese production will take time and demand additional initial investments and that the quality has to be guaranteed.

[10] The imported container was half empty and the empty space subsidized by Helvetas-IDE, i.e. importation costs on market terms would account for an even higher share in the final price.

Local or Chinese production thus should be considered as a continuing process and the importation of parts of DIS from India must remain a possible option.

As a market research in neighboring China in Urumqi has shown, all necessary parts for a low-cost DIS are presently available in China and thus prices, transportation costs, delivery times as well as quality issues become the most decisive factors regarding from where to import (China or India) and where to produce (Kyrgyzstan or China). Focus for Kyrgyz production must lie on the parts that are expensive to import into the country (e.g. non-collapsible tubes) and the sourcing of the remaining necessary components should be decided as to quality and price concerns. It has to be stressed however, that procuring parts from various sources in different countries will increase the risk that some parts will not fit each other and should therefore be closely watched. Kyrgyz and Chinese production in the short term, as long as the market potential in Kyrgyzstan is not clear yet, should only be undertaken for parts that do not require high initial investments, i.e. that do not require the fabrication of moulds for injection moulding and at the same time offer the highest saving potential in the production process.

It is up to now unknown if market demand even in the mid-long term will be high enough to justify economically to entirely produce low-cost drip technology in Kyrgyzstan. Yet demand might be speeded up by selling as quickly as possible also to other Central Asian countries with Tajikistan offering the highest potential in the short term.

For more details regarding the technical background of the production process, specific Kyrgyz and Chinese plastic producers and their potential please refer to Appendix I "*Market Concept for Low-cost Drip Irrigation Systems in Kyrgyzstan*".

2.2 Organizing the Wholesale

The wholesaler will play a key role in the future supply chain and a close and transparent cooperation with the Helvetas-IDE project is essential.

The cooperation with the AESP ZOKI as a wholesaler at the initial stage of the market creation process is a reasonable solution, since this organization is trusted, transparent and cooperation in other projects in the past was successful. However in the longer run, since ZOKI does neither have a commercial background nor plans to build commercial capacities, it is not the right partner. Cooperation with ZOKI should rather focus on tasks such as the spread of knowledge and know-how about drip irrigation in general. A stakeholder without commercial background will not start investing its own resources and only fulfill the tasks delegated and paid for by a facilitating agency. It has to be further considered that once an institution plays such an important role as the wholesaler, it cumulates important knowledge which will be difficult to confer to a different actor later on in the process.

The role of the wholesaler should ideally be taken by a commercial institution which is not

only already acting as such and has the necessary infrastructure (administration and warehouse), but also is convinced about the advantages of low-cost, easy to use DIS and believes in its perspectives in Kyrgyzstan and in Central Asia in general. Only in that case in the future the company will invest its own resources in the creation of the market and a respective supply chain. However since low-cost DIS in Kyrgyzstan is practically unknown, considerable time- and monetary expenditures are required to make the technology known and initiate the introduction phase of the market creation process. Therefore a future wholesaler in the short run needs to be supported regarding promotional activities either because it initially considers the risk to be too great or it simply lacks the financial means to do so. However if the technology proves successful under Kyrgyz conditions, it will continue spreading with private sector money in the mid-, long-term.

Even if local or Chinese production will be initiated, several parts of a DIS will still need to be imported from either China or India; hence in the cooperation with a future wholesaler it is of importance that the process of importation is reliable, responsibilities are clearly defined and importation costs are, if possible, reduced.

Three possible future wholesalers have been evaluated as to opportunities and risks of cooperation; that is the present wholesaler ZOKI as well as Seagulls International Ltd and Agroline Ltd.. All of them have different strengths and weaknesses and at this stage it is difficult to determine the best wholesaling partner for Helvetas-IDE. Seagulls International Ltd. however seems to offer most advantages, since they are well established and commercially profitable, they are involved in Kyrgyz-Indian-Chinese trade, they offer the option to expand into Tajikistan and Uzbekistan due to their network of retailers and they already invest own resources in the spread of drip technology.

Nonetheless it is suggested that in case of a second import from India or China there should be an open call for tenders asking all potential wholesaler to submit a business concept. The company with the best offer would then get the 2nd container for management. The conditions and requirements for such a call for tenders should be clarified as quickly as possible in order to be able to assign the wholesale task from ZOKI to a more promising partner. If meanwhile parts of a drip system need to be imported from India or China, it is suggested that this is done via Seagulls or at least this option is checked with them. Not only do they have comparatively the most experience, but importation via them also allows checking their way of cooperation with Helvetas-IDE.

Regarding the terms of cooperation with a future wholesaler with the Helvetas-IDE project, i.e. possible establishment of a drip fund to support the future creation of the market, different ways of support, etc., and the handing over of the wholesale responsibility from ZOKI details will have to be clarified.

As to profitability concerns at wholesale level scenarios of minimum yearly sales turnover have been assessed regarding total fixed costs and the profitability of different margins on sales. The

results can be found in the entire report in Appendix I.

2.3 Organizing the Retail

Retailers build the crucial link between a wholesaler and the final customers. They will not only be responsible for the sales of DIS, but also for its installation and maintenance and in case of warranty issues will be the front office for farmer's complaints. Furthermore especially in the introduction phase of a market creation process retailers will be the ones to identify first potential customers, i.e. innovators and early adopters that are willing and able to take some risks and try out the technology in their fields. Therefore retailers will need some knowledge about the advantages of drip irrigation in general and how to install and maintain low-cost drip systems specifically. Only if retailers believe in the perspectives of drip technology in their region and notice the financial benefits for them, they will start invest their own resources in the promotion and sales of it.

Nevertheless in the introduction phase of the market creation process, retailers will need to be supported regarding promotional activities by the Helvetas-IDE project. Generally in the present retailers' point of view the potential for low-cost DIS and the interest of farmers in drip irrigation in Kyrgyzstan is considered as high or very high. However since the technology is not known, demonstrations of low-cost DIS need to be installed and field days conducted (dynamic promotion).

Different kinds of retailers were identified and assessed as to opportunities and risks of cooperation; that is commercial retailers, agricultural service providers and cooperatives. They have different strengths and weaknesses as to their knowledge of local agricultural conditions and generally about drip technology, sales and marketing experiences, access to remote areas, their store network or financial situation, etc. It is therefore suggested to evaluate their sales figures and performance once the sales season of 2011 is over.

As to profitability concerns it has to be ensured that retail margins are high enough right from the beginning in order that the financial incentives for retailers are high enough that they want to promote and sell low-cost DIS with their own means. In this regard it will be most straightforward not to fix a final sales price, but to leave this up to the retailing partners and only give price recommendations. Retailers therefore will pay an ex warehouse price to the wholesaler and decide the final sales price themselves.

In the mid-term it will be the retailers with the highest sales turnovers that are able to offer the lowest prices i.e. that need the lowest margins. It is therefore very likely that a concentration process will take place. Donor or project supported retailers are however having a head start, since they are not required to cover all of their fixed costs.

To guarantee the delivery of low-cost DIS in more remote places to smallholding farmers, the Helvetas-IDE project will very likely need to support and convince agro shops, cooperatives and

agricultural service providers to demonstrate, deliver and sell drip systems also in such places at least in the initial stages of the market creation process. In the mid-long term it has to be stressed however that if retailers will see a market potential in remote places they will very likely also start marketing low-cost DIS there. Besides once knowledge about low-cost DIS will have spread and farmers in remote areas will find out about the product and consider it useful and beneficial, they will themselves come to central places where low-cost DIS are available.

Also at retail level different scenarios of minimum necessary yearly sales turnover have been assessed regarding yearly total fixed costs and the profitability of different margins on sales. The results can be found in Appendix I.

It is further suggested that some retail partners get away from a pure hardware selling approach, selling exclusively drip systems, but start selling whole packages to farmers that allow the latter producing more effectively and efficiently. That is they may provide farmers with all the necessary agro-inputs (seeds, fertilizers, low-cost drip systems, greenhouses, etc.) as well as the necessary know-how and after-sales services. This package should guarantee considerably higher yields for a farmer and can be made affordable in cooperation with micro-finance institutions pre-financing the package. Agricultural service providers are best suited to offer such packages and some of them already have a micro-finance branch. Nevertheless the identification of micro-finance institutions willing to cooperate and possible payback schemes need to be followed up.

2.4 Promotion and Spread of Knowledge about Drip Irrigation

First of all it has to be stressed that presently drip technology is unknown to most Kyrgyz farmers and therefore knowledge and advantages of the technology have to be first established and spread throughout the country with the help of an effective marketing strategy. In the present introduction phase with some financial support by Helvetas and IDE for mainly dynamic promotion - such as demo plots, farmer field days and personal selling - drip technology will however successfully start spreading among innovative and early adopter Kyrgyz farmers already in the short term.

Yet as mentioned in order to reach poorer, smallholding farmers, drip technology in general has to be first popularized. For the market creation project this will only be possible by targeting innovative farmers that are able to take some risks and try out drip. Only in a second step the technology can then be successfully marketed to all remaining customer segments including poorer smallholders. This is not to say that poorer farmers in Kyrgyzstan are not willing and able to try out drip on their fields already in the introduction phase. During the internship for instance women's groups have been visited that share a small 200 square meter greenhouse and have put their money together to buy a drip system and thus reduce the burden of daily bucket irrigation inside the greenhouse.

As seen above drip technology in Kyrgyzstan can be used for various purposes and thus within each purpose markets must be created. This means that not only richer commercial farmers growing exclusively cash crops can use the technology, but that it is also beneficial for poorer smallholders that use drip for subsistence farming and home gardening. Almost the whole rural population in Kyrgyzstan has some small land holding and for many of them irrigation and efficient use of water is a growing problem due to the old run-down irrigation infrastructure and unreliable rainfall patterns because of the changing climate. In consequence it is of utmost importance to keep sales prices as low as possible in order to make the technology available for all.

It is furthermore important that there are quickly as many as possible DIS installed and exhaustively tested in order to gain valuable insights as to quality and profitability concerns and at the same time to serve promotional purposes. The bigger the number of demos however, the less it is possible to guarantee the quality with available project resources. Thus fewer demos, managed by motivated farmers who invested their own money are better than many subsidized or pushed demos. A balance has to be found.

Also the more the technology spreads the more Kyrgyz drip specialists will emerge. However a detailed manual for retailers which includes all necessary information regarding the promotion, sales, installation, maintenance and repair of DIS of different technologies, forms and sizes in various conditions must be developed by the actual drip specialists of ZOKI in order that such specialized knowledge about drip technology spreads more easily.

Warranty should be provided for a 12 month period in order to reduce the risks for farmers, for instance if they bought it on credit, to generally guarantee the quality and warranty cards will provide valuable information to analyze the market and the overall market creation progresses.

Already in the short term the drip systems must be sold under a newly developed brand by a future wholesaler or possibly also the project and should include various drip systems of various quality and prices, i.e. Indian and Chinese. This also means that systems must be available in individual parts. A farmer should thus be able to choose what kind of product fits him most. As mentioned in the theoretical part branding also allows quicker spreading the technology through commercial channels, that the promotional activities and materials come along in the same look and facilitates the handing over of the responsibilities for promotion to a future wholesaler and its respective network of retailers.

The sale volumes and area in Kyrgyzstan should be increased by acquiring new retail partners in places where drip technology may be beneficial and in cooperation with a new wholesaler the availability of whole DIS and spare parts should be ensured through an efficient warehouse system. The timing of the promotional activities throughout the year should lie within the responsibilities of the wholesaler and retailers, but must be defined according to the planting and dry season(s) in

Kyrgyzstan. Various discount policies are an option to check with a future wholesaler at retail as well as farm level and cooperation options with microfinance institutions for the sales of drip technology and possible pay back schemes need to be followed up as quickly as possible. Due to the actual ethnic-cultural conflict in Kyrgyzstan the supply chain must reach both Kyrgyz and Uzbek communities, i.e. Uzbek and Kyrgyz retailers have to be established. The opportunities to expand the sales of drip irrigation also to other Central Asian countries, especially Tajikistan should be imperatively followed up with already identified partners.

With regard to sustainability and profitability concerns as soon as possible stakeholders at the wholesale and retail level should organize promotional materials and activities themselves and include the expenses in their margin on sales. This also concerns expenses for advisory, transportation, installation and maintenance services. In this regard the mentioned option for some retailers to sell in cooperation with micro-finance institutions whole packages of agro-inputs and know-how that allow farmers getting higher yields should be imperatively followed up.

Partners of the Helvetas-IDE project for promotional activities can be SEP partners/NGOs and agricultural extension services, water user associations, cooperatives and commercial shops. All of them are well integrated into their local context and know farmers that might be willing and for whom it is profitable to use drip technology. Agricultural extension services are best suited to sell whole hardware and software packages of not only drip technology, but of all kinds of agro-inputs and know-how since they usually have the broadest understanding about efficient and effective agricultural techniques and technologies.

3 Outlook for Kyrgyzstan and other Central Asian Countries

In Kyrgyzstan it is possible that two years from now the entire supply chain consisting of Kyrgyz, Chinese and possibly Indian plastic producers, a wholesaler, commercial retailers, NGOs, cooperatives and satisfied farmers will work efficiently and the market creation program of Helvetas and IDE will be able to focus its support exclusively on promotional activities to generate demand not only for a specific low-cost drip technology brand, but for drip technology in general. Regarding financial and technical support for individual stakeholders in the supply chain a balance has to be found between the narrow goal of profit of specific players and the overall goal of creating the market.

It is important to keep in mind that creating a market for drip technology and changing in this way also the cultivation methods of many farmers will need time and will require considerable expenses not only for the promotion of drip technology specifically, but for the general training of farmers how to appropriately irrigate according to crop and soil norms. Efforts in this direction therefore need to continue.

Farmers must to be convinced that drip technology not only allows using water efficiently, but

that it can generate higher incomes or save money in order that they will start using it. This however requires a certain entrepreneurial and innovative spirit of farmers regarding how to make most out of their land owing, which is difficult to create by a market creation project alone. In this regard the most promising option in the initial phases of the market creation process is certainly focusing efforts of the project and of its partner organizations on innovative, risk taking farmers that play the role of opinion leaders in their communities and thus influence the behavior and agricultural techniques of farmers surrounding them. Another option is to sell not only drip hardware, but whole agro-input packages including know-how and services that allow farmers increasing the productivity on their given land holdings. This should be done in cooperation with micro-finance institutions and possibly also micro-insurances to make such packages affordable and reduce the risks for poorer farmers.

As soon as the market for low-cost DIS in Kyrgyzstan will offer sustainable benefits for all stakeholders in the supply chain, i.e. high enough sale turnovers are being generated and also poorer smallholding farmers will start buying and using drip technology in more remote areas and for subsistence farming, the market creation program of Helvetas and IDE will have truly overcome the three challenges - promotion, supply chain and local procurement - and can call itself a success also regarding poverty alleviation.

The goal in the long term must be a vivid, many stakeholders involving market for drip technology in Kyrgyzstan and desirably other Central Asian countries independent of any donor support, in which all the parties involved act out of their own financial interest and all farmers, rich and poor, small and big, have the option to use various forms of drip technology on their fields.

IV CONCLUSION

"Life has come full circle for me. Thanks to affordable drip irrigation technology, I have banished failure from my life. Each day is brighter".

Sandaya, smalllholding farmer in Uttar Pradesh, India (2009)

This thesis is about an approach in development aid that works. The aim is to lift people at the BoP in developing countries out of poverty by creating a market and promoting specific products and services that enhance the productivity and are able to generate income within a short period of time. This thesis thus presented a market creation approach with the specific focus on low-cost drip irrigation technology for smallholding farmers. The aim of the study was to present past and actual scientific literature as well as empirical observations of two internships in India and Kyrgyzstan in order to apply lessons learnt to the specific Kyrgyz context in a theory-confirming case study. The goal of the practical part was therefore to disclose opportunities as well as risks regarding the feasibility and implementation of a market creation project in Kyrgyzstan and possibly other Central Asian countries.

As outlined poverty, however, is a very complex issue. It is multidimensional and does not only concern income issues. Although modern international development aid - bilateral and multilateral - exists for almost 60 years, achievements regarding effective poverty alleviation are only mediocre and presently still more than two billion people live on less than US$ 2 (PPP) a day. Development strategies of the past and present are various and highly controversial as to their effectiveness, since often they were and still are conceived in a centrally planned manner, they were either conditioned on political interests of the richer donor countries and/or were incoherent with other policy goals of either donor or recipient country. Also government and governance structures in developing countries are of utmost importance to reduce poverty on a grand scale. But triggering institutional and policy reforms in developing countries that lead to pro-poor economic growth surmounts the capabilities of the present aid system. New development approaches are therefore in need that effectively allow bypassing these issues. And - that's the good news - since the late 90s they are around and started being put into practice.

The rationales of these new approaches are based on market forces and the goal is to involve the poor actively as either consumer or producers in economic activities. Specific interventions by development agencies into a market and respective market system therefore should not only make the latter more effective as to meeting the needs of the poor, but also allow the people at the BoP benefiting from overall economic growth and thus eventually lift them out of poverty.

Markets and market systems including rules and norms as well as supporting functions are however of high complexity and often interconnected with other markets. Interventions by a

development agency therefore must be based on an in-depth understanding of a specific market and its local context and should not touch the core of demand and supply in order to avoid market distortions. They have to be limited in time, thus come with a realistic pulling out strategy and should have the ultimate aim of building on the capabilities of local actors rather than direct delivery of goods or services. Due to this complexity leaving market creation approaches to the private sector alone will not solve the problem of extreme poverty. Facilitating agencies need to step in and in cooperation with private and public institutions have to intervene in markets in favor of the poor. Because neither development agencies nor the private sector alone have the capacities and means or enough financial incentives to effectively intervene in or create a market at the BoP themselves.

Concluding, it must also be emphasized that not all poverty related issues offer the potential to be solved with market creation approaches. Especially in the field of short-term emergency relief such as urgent food aid or aid after natural disasters, market creation approaches are unlikely applicable. Also there is always the risk of failure of market creation programs due to external constraints that are not influenceable by facilitating agencies as for instance political turmoil in the case of Kyrgyzstan. William Duggan (2003, p.80) in this regard tellingly writes: *"Even if you do everything right, you still may fail."* Nevertheless, efforts need to continue, since market-based development approaches give those living at the BoP the opportunity and chance to participate actively in the quest for better livelihoods.

Implications of the practical part in Kyrgyzstan are in addition to the necessary cooperation between the private and public sector, the possibility of not only creating a market for affordable drip technology, but to create market channels that sell whole packages of various inputs that make farmers more productive. This package needs to be made available in cooperation with micro-finance institutions. The role of the wholesaler should be transferred as quickly as possible to a private commercial company that already in the short-term will invest its own resources into the promotion of specific brands and the creation of a reliable supply chain. Furthermore a marketing strategy must be based on a strong brand, on dynamic promotion and gain momentum by word of mouth of satisfied innovative farmers that play the role of opinion leaders in their communities. Eventually only with an effective and efficient marketing strategy demand and sale volumes can be generated quickly enough in order that enough financial incentives for private stakeholders involved emerge without the need to excessively rise the final purchasing price for farmers. The evaluation of the overall socio-economic situation of Kyrgyzstan's smallholding farmers and the hydro-climatic and ecological conditions in the country require and allow that the use of low-cost drip irrigation technology is substantially scaled up within the next two years.

In the end if a market creation program for a productivity enhancing good such as drip irrigation is successful it may actually serve as an exit strategy for development aid and the modern

aid system that presently is still full of controversies.

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F) APPENDIX

I Market Concept for Low-cost Drip Irrigation Systems in Kyrgyzstan

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Report

Market Concept for Low-cost Drip Irrigation Systems in Kyrgyzstan

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Prepared by:

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Prepared for:

Helvetas, Central Asia

International Development Enterprises

Bishkek, June 2011

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Executive summary

This report presents the results of a three month internship of Markus Brauchli for International Development Enterprises (IDE) and Helvetas in Kyrgyzstan in spring 2011 with the goal to create a market for low-cost drip irrigation systems in Kyrgyzstan.

The objective of the internship was to develop a market concept at all levels from plastic producer to the farmer for the creation of a sustainable supply chain for low-cost drip irrigation systems (DIS).

In late 2010 IDE in collaboration with Helvetas SEP project imported a container from India with DIS of various sizes in order to test the market potential at farm level and to initiate a market creation process in Kyrgyzstan and potentially also other Central Asian countries.

This report is based on a classical case study method; the main task was the collection of data and identification of partners at each level of the supply and value chain through meetings, interviews, fieldwork and background research. During three months around 40 interviews have been conducted at all levels of the supply and value chain - i.e. plastic production, wholesale, retail and farm - focusing on three main challenges:

1. Creation of a sustainable supply chain for all stakeholders
2. Promotion and spread of knowledge about drip irrigation
3. Local or Chinese production/procuring of drip irrigation systems to allow competitive (low) production costs and reduce transportation costs

Solutions have been identified to successfully meet these challenges and the results are summarized in the present report.

Since sales have has just started, the process of creating a market is still in the introduction phase. Spreading the knowledge about low-cost drip in Kyrgyzstan and changing the present irrigation methods of farmers will take time and the first results and exact figures as to testing the Kyrgyz market will be available only by the end of the sales season 2011. Only by then results will be available for the project to allow taking informed decisions how to continue in the years to come.

Creation of a Sustainable Supply Chain

The Helvetas-IDE project needs to identify and build up channels through which drip technology is being produced, sold and delivered at present and in the mid-long term in a sustainable way, i.e. that there are benefits and financial incentives at each level of the supply and value chain.

At production level various plastic producers in Kyrgyzstan have been identified and assessed as to their capabilities to produce (parts of) DIS. Moreover on a market research trip to Urumqi available Chinese drip systems have been identified as well as options to produce (parts of) DIS in China.

It is suggested that the option of Kyrgyz or Chinese production are postponed until the evaluation of the sales season 2011.

Regarding the profitability at production level it has to be stressed that plastic producers will only sell at market terms and that ex works prices decrease with a higher the order volume. In case of sourcing in China middlemen should be as far as possible avoided and negotiation should be conducted in close cooperation with a future wholesaler.

At wholesale level three potential wholesalers have been interviewed and assessed, that is ZOKI as the present wholesaler, Agroline Ltd. and Seagulls International Ltd.. Profitability scenarios as to fixed costs and necessary sales turnovers have been undertaken. At this stage it is difficult to pinpoint the best wholesaling partner for Helvetas-IDE, although Seagulls International Ltd. seems to offer most advantages.

It is suggested that in case of a second import from India or China there should be an open call for tender. The company with the best business concept would then get the 2nd container for management.

If meanwhile parts of a drip system need to be imported either from India or China, it is suggested that this is done via Seagulls or at least this option checked with them.

Regarding the terms of cooperation with a future wholesaler with the Helvetas-IDE project – i.e. possible establishment of a drip fund, different ways of support, etc. – and the handing over of the wholesale responsibility from ZOKI have to be clarified as quickly as possible, that is still in 2011.

At retail level present retailers have been assessed as well as potentially new retailers identified. Profitability scenarios as to fixed costs and necessary sales turnovers have been undertaken.

Commercial agro-input shops, agricultural service providers and cooperatives can play the role of retailer. It is suggested that at the end of the sales season 2011 all present retailers should be assessed regarding their performance and terms of cooperation and financial support conditions for the sales season 2012 specified.

The focus in 2012 should lie on the retailers that sold most systems in 2011 and main reasons should be identified why some retailers were not able to sell much in 2011.

In order to guarantee that low-cost DIS are also available in more remote places in 2012 and to small holder farmers, Helvetas-IDE project will need to assess and identify retailers also in this respect and negotiate necessary terms of cooperation.
A competitive market incorporating enough retail players has to be guaranteed.
It is further suggested that some retail partners get away from a pure hardware selling approach, selling exclusively drip systems, but start selling whole packages to farmers that allow the latter to produce more effectively and efficiently. That is they may provide farmers with all the necessary agro-inputs (seeds, fertilizers, low-cost drip systems, greenhouses, etc.) as well as the necessary know-how and services. This package should guarantee considerably higher yields for a farmer and can be made affordable by cooperating with micro-finance institutions pre-financing the package.
At farm level it is important that still in 2011 as many as possible innovative farmers are identified by the retailing partners and start using drip technology. During field days it has to be guaranteed that as many as possible interested farmers are invited and get acquainted with the technology.
It should be ensured that first mover farmers are closely followed as to their experiences with the technology and especially as to problems that occurred. If problems occur, reliable advice and possibly spare parts must be quickly delivered.
Specific advantages of the use of DIS at farm level under Kyrgyz conditions should be documented and included in the promotional materials for 2012.
Materials that have been imported from China in June 2011 should be sold and installed at farm level in order to test the quality and practicality and to compare them with the Indian systems.

Promotion and Spread of Knowledge about Drip Irrigation
Drip technology is unknown to most Kyrgyz farmers and knowledge and advantages of the technology have to be first established and spread throughout the country with the help of an adequate promotional strategy.
In Kyrgyzstan drip irrigation may be used for the following purposes and should be promoted with a respective strategy:

- Preservation of existing, partly irrigated orchards where due to deteriorated pumping systems, climate change or other reasons water is getting scarce
- Exploitation of new areas for orchard or vegetable plantation which so far lied idle due to lack of water
- Augmentation of irrigation water efficiency on existing plots (orchards and vegetables) where it is burdensome and expensive to irrigate due to its location.
- Irrigation inside greenhouses

In the introduction phase of the market creation process with support for promotion by the project, especially for demo plots and field days, drip technology will successfully start spreading among innovative Kyrgyz farmers in the short term. In order to reach poorer, small holding farmers, drip technology in general has to be first popularized. For the project this will only be possible by targeting innovative farmers that are able to take some risks and try out drip. Only in a second step the technology can then be successfully marketed to all remaining customer segments including poorer small holders. This is not to say that poorer farmers in Kyrgyzstan are not willing and able to try out drip in their fields. During my internship for instance women's groups have been visited that share a small 200 square meter greenhouse and have put their money together to buy a low-cost drip system and thus reduce the burden of daily bucket irrigation inside the greenhouse.
As mentioned above drip technology in Kyrgyzstan can be used for various purposes and thus within each purpose DIS should be promoted. This means that not only richer commercial farmers growing exclusively cash crops will be using drip technology, but that it is also beneficial for poorer small holders that use drip for subsistence farming and home gardening. Almost the whole rural population in Kyrgyzstan has some (small) land holding and for many of them irrigation and efficient use of water is a growing problem due to old, run-down irrigation infrastructure and unreliable rainfall patterns because of the changing climate. In this regard it is of utmost importance to keep selling prices as low as possible.
Furthermore it is important that there are quickly as many as possible DIS installed and exhaustively tested in order to gain valuable insights as to quality and profitability concerns and at the same time serving promotional purposes. Also the more the technology spreads the more Kyrgyz drip specialists will emerge.
Warranty should be provided for a 12 month period in order to reduce the risks for the farmers, guarantee the quality and the warranty cards will provide valuable information to analyze the market.
The drip systems should be sold under a newly developed brand by a future wholesaler or possibly also the project and should include various drip systems of various quality and prices, i.e. Indian and Chinese. A farmer should thus be able to choose what kind of product fits him most. This also means that systems must be available in individual parts.
Branding also allows that the promotional activities and materials will come along in the same look and to hand over the

responsibilities for promotion to a future wholesaler and its respective network of retailers.
Various discount policies are an option to check with a future wholesaler and cooperation options with microfinance institutions for the sales of drip technology and possible pay back schemes need to be followed up.
The sales area in Kyrgyzstan should be increased by acquiring new retail partners in places where drip technology may be beneficial and in cooperation with a new wholesaler the availability of whole DIS and spare parts should be ensured through an efficient warehouse system.
Due to the actual ethnic-cultural conflict in Kyrgyzstan the supply chain must reach both Kyrgyz and Uzbek communities, viz. Uzbek and Kyrgyz retailers have to be established.
A detailed manual for retailers which includes all necessary information regarding the promotion, sales, installation, maintenance and repair of DIS of different technologies, forms and sizes in various conditions must be developed by the actual drip specialists of ZOKI.
With regard to sustainability and profitability concerns as soon as possible stakeholders at the wholesale and retail level should organize promotional materials and activities themselves and include such expenses in their sales prices. This also concerns expenses for advisory, transportation, installation and maintenance services. In this regard the already mentioned option for some retailers to sell in cooperation with micro-finance institutions whole packages of agro-inputs and know-how that allow farmers getting higher yields should be imperatively followed up. Agricultural extension services are best suited to sell such packages since they usually have the broadest understanding about efficient and effective agricultural techniques and technologies.
In the introduction phase of the market creation process the focus should be on dynamic promotion such as personal selling and farmer field days on demo plots.
Partners for promotional activities can be SEP partners/NGOs and agricultural extension services, water user associations, cooperatives and commercial shops.
The timing of the promotional activities throughout the year should lie within the responsibilities of the wholesaler and retailers, but should be defined according to the planting and dry season(s) in Kyrgyzstan.
The opportunities to expand the sales of drip irrigation also into other Central Asian countries, especially Tajikistan should be imperatively followed up with already identified partners and will allow generating more quickly the necessary high sales turnovers.

Local or Chinese Production/Procuring of Drip Irrigation Systems

Since importation costs for Indian systems are high and delivery times long, the Helvetas-IDE project together with the private sector in the short-mid term must consider the option of (partial) local or Chinese production in order to be able to minimize purchasing prices and thus make drip available to each and every farmer segment.
Production of the Indian designed DIS is possible both in Kyrgyzstan and China at considerably lower costs (up to 50%). Moreover the option of importation of Chinese designed drip systems should be imperatively considered, since delivery times are shorter, the DIS are cheaper and also seem to be of higher quality.
Focus for Kyrgyz production must lie on the parts that are expensive to import into the country (e.g. non-collapsible tubes) and the sourcing of the remaining necessary parts should be decided as to quality and price concerns.
It has to be kept in mind that building up local or Chinese production will take time and demand additional initial investments and that the quality has to be guaranteed.
Local or Chinese production should be considered as a continuing process and thus the importation of parts of DIS from India must remain a possible option.
It has to be stressed however, that procuring parts from various sources in different countries will increase the risk that some parts will not fit each other and should therefore be closely watched.
Kyrgyz and Chinese production in the short term - as long as the market potential in Kyrgyzstan is not clear yet – should only be undertaken for parts that do not require high initial investments, i.e. that do not require the fabrication of moulds for injection moulding and at the same time offer the highest saving potential.
It is up to now unknown if the market demand even in the mid-long term will be high enough to justify economically to entirely producing low-cost DIS in Kyrgyzstan.

Conclusion

In my opinion two years from now, the entire supply chain consisting of Kyrgyz, Chinese and possibly Indian plastic producers, a wholesaler, commercial retailers, NGOs, cooperatives and satisfied farmers will work efficiently and Helvetas-IDE will be able to

focus its support exclusively on promotional activities to generate demand not only for the specific low-cost DIS, but for drip technology in general.

It has to be stressed that regarding financial and technical support for individual stakeholders in the supply chain a balance has to be found between the narrow goal of profit of specific players and the overall goal of creating the market.

It is important to keep in mind that creating a market for drip technology and changing in this way also the cultivation methods of many farmers will need time and will require considerable expenses not only for the promotion of drip technology specifically, but for the training of farmers in general how to rightfully irrigate.

Moreover farmers need to be convinced that drip technology not only allows using water efficiently, but that it can generate higher incomes or save money in order that they will start using it. This however requires a certain entrepreneurial and innovative spirit of farmers as to how to make most out of their land owing, which is difficult to create by the Helvetas-IDE project itself. In this regard the most promising option in the initial phase of the market creation process is certainly focusing efforts of the project and of its partner organizations on innovative, risk taking farmers that play the role of opinion leaders in their communities and influence the behavior and agricultural techniques of surrounding farmers.

Another option is to sell not only drip hardware, but whole agro-input packages including know-how and services that allow a farmer to become more productive on his given land holding. This should be done in cooperation with agricultural service providers and micro-finance institutions to make such packages affordable.

As soon as the market for low-cost DIS in Kyrgyzstan will offer sustainable benefits for all stakeholders in the supply chain, i.e. high enough turnovers are being generated and also poorer small holder farmers will start buying and using drip technology in more remote areas and for subsistence farming, Helvetas-IDE will have truly overcome the three challenges – promotion, supply chain and local procurement – and can call itself a success.

The goal in the long term must be a vivid, many stakeholders involving market for drip technology in Kyrgyzstan and desirably other Central Asian countries independent of any donor support, in which all the parties involved act out of their own (financial) interest and all farmers, rich and poor, small and big, have the option to use various forms of drip on their fields.

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IV. Abbreviations

- DIS: Drip Irrigation System(s)
- GEWP: Global Easy Water Product Pvt. Ltd.
- IDE: International Development Enterprises
- NGO: Non-governmental Organization
- RAS: Rural Advisory Services
- SDC: Swiss Agency for Development and Cooperation
- SEP: On-Farm Water Management Project – Efficient Use of Water (SEP) of Helvetas Central Asia
- USAID: United States Agency for International Development
- WUA: Water User Association
- ZOKI/ЦОКИ: Public Foundation “Training, Advisory and Innovation Centre” / Общественный Фонд «Центр Обучения, Консультации и Инновации»

1. INTRODUCTION

This report presents the results of a three month internship of Markus Brauchli for International Development Enterprises (IDE) and Helvetas in Kyrgyzstan in spring 2011.
The main task was the collection of data and identification of partners through meetings, interviews, fieldwork and background research with the goal to create a market for low-cost drip irrigation systems in Kyrgyzstan.
The objective of the internship was to develop a market concept at all levels from plastic producer to the farmer for the creation of a sustainable supply chain for low-cost drip irrigation systems (DIS).
Drip technology of high and low-cost had been introduced previously in the country by various programs and projects - private and public – and showed persuasive results. Yet these efforts were limited to demonstrational and technical purposes and up to present no attempts have been undertaken to solve the problem of reliable supply to Kyrgyz farmers in case they actually want to buy and permanently use drip technology. Farmers might have wanted to buy, but there was just no supply.
Therefore in late 2010 IDE in collaboration with the "Efficient Use of Water Project" (SEP) of Helvetas imported a container from India with low-cost DIS of various sizes and started to sell these systems in spring-summer 2011 in order to test the market potential at farm level and to initiate a market creation process in Kyrgyzstan and potentially also other Central Asian countries.
The imported systems are presently successfully sold in India, Central America and various States in East and West Africa. Compared to conventional DIS they are easy to install and maintain and are designed in a way to reduce sales prices as much as possible, thus low-cost.
For this report three main challenges have been indentified and were focused on during the internship: (see also Appendix I: Work Plan)

1. Creation of a sustainable supply chain for all stakeholders
2. Promotion and spread of knowledge about drip irrigation
3. Local or Chinese production/procuring of drip irrigation systems to allow competitive (low) production costs and reduce transportation costs

These three factors require special attention and therefore surveys were carried out among stakeholders from different parts of the supply chain with the aim to identify solutions to successfully meet these challenges.

First the Helvetas-IDE project needs to identify and build up channels through which drip technology is being produced, sold and delivered at present and in the mid-long term in a sustainable way, i.e. that there are benefits and financial incentives at each level of the supply and value chain, i.e. at the production, wholesale, retail and farmer level.
It has to be stressed that regarding financial and technical support for individual stakeholders in the supply chain a balance has to be found between the narrow goal of profit of specific players and the overall goal of creating the market.
Therefore existing retailers and wholesalers have been assessed and potential new partners identified as to what opportunities and risks they present for cooperation. Furthermore a general profitability analysis has been conducted at each level of the supply and value chain and showed that low-cost DIS can spread sustainably in Kyrgyzstan provided high enough sales turnover will be generated as soon as possible.

Second since drip technology is unknown to most Kyrgyz farmers, knowledge and advantages of the technology have to be first established and spread throughout the country with the help of an adequate promotional strategy.
Kyrgyzstan is a country where water scarcity is acute in particular zones and during peak times and not always obvious at first glance. Water in many parts of Kyrgyzstan is considered a resource free of charge (gift of God), which is easily available and many farmers hold that only the irrigation infrastructure should be paid for. Therefore many farmers do not have the knowledge how to rightfully, efficiently and effectively irrigate their crops. They for instance lack knowledge about the irrigation needs of different crops. SEP project is trying to improve this situation. However there are regions where water is only in limited amounts available or where it is costly and burdensome to direct irrigation water to agricultural fields. Moreover the irrigation infrastructure still originates from soviet times and is mostly in a poor shape.
According to this setting in Kyrgyzstan drip irrigation may be used for the following purposes and should be promoted with a respective strategy:

- Preservation of existing, partly irrigated orchards where due to deteriorated pumping systems, climate change or other reasons water is getting scarce
- Exploitation of new areas for orchard or vegetable plantation which so far lied idle due to lack of water

- Augmentation of irrigation water efficiency on existing plots (orchards and vegetables) where it is burdensome and expensive to irrigate due to its location.
- Irrigation inside greenhouses

The present situation has been analyzed using the well established four Ps of marketing and existing and potentially new leverage points for introducing drip in Kyrgyzstan have been identified and assessed.
In the introduction phase with some support for promotion for various stakeholders in the supply chain, especially for demo plots and field days, drip technology will successfully start spreading among (innovative) Kyrgyz farmers already in the short term. However with regard to sustainability and profitability concerns it has to be stressed that as soon as possible stakeholders at the wholesale and retail level should organize promotional materials and activities themselves and include such expenses in their sales prices. This also concerns expenses for advisory, transportation, installation and maintenance services.

Thirdly, since importation costs for Indian systems are too high and delivery times long, the Helvetas-IDE project together with the private sector in the short-mid term must consider the option of (partial) local or Chinese production in order to be able to minimize purchasing prices and thus make drip available to each and every farmer segment.
Therefore production capabilities both in Kyrgyzstan and China have been assessed and analyzed and price comparison with regard to importation from India conducted. Moreover the availability of Chinese made drip systems has been examined during a one week trip to Urumqi in Western China.
It turns out that production of the imported DIS is possible both in Kyrgyzstan and China at considerably lower costs. Moreover the option of importation of Chinese designed drip systems should be imperatively considered, since they are not only cheaper, but also of higher quality. In this case the importation of any material from India would not be necessary anymore.
However building up production and new delivery channels will take time and require initial investments, thus the importation of parts of DIS from India should remain a possible option.
Also local or Chinese production will only be economical, once sales figures in Kyrgyzstan are taking up. Sales figures can be more quickly increased by spreading low-cost DIS not only in Kyrgyzstan, but also in neighboring Central Asian countries with Tajikistan offering the highest potential in the short-mid term.
Since the sales season 2011 has just started, the process of creating a market is currently on its way, yet still being in the introduction phase.
It has to be stressed that spreading the knowledge about low-cost drip in Kyrgyzstan and changing the present irrigation methods of farmers will take time and the first results and exact figures as to testing the Kyrgyz market will be available only by the end of the sales season 2011. Moreover the brought in Chinese drip materials should be tested already in 2011 as well. Only these results and figures will allow taking informed decisions how to continue in the years to come.
This report is structured according to these three identified challenges.
Chapter 2 presents the method used for this report explaining the objectives of this survey for each level at the supply and value chain, gives an overview as to who and how many persons and institutions have been interviewed and what interview guidelines have been used.
Chapter 3 assesses each level of the supply and value chain – i.e. stakeholders at farm, retail, wholesale and production level - as to opportunities and risks of cooperation with indentified partners and also regarding profitability concerns, the chapter is closed giving recommendations how to continue in the short-mid term.
Chapter 4 according to the 4 Ps of marketing presents the current situation in Kyrgyzstan regarding the up to now imported drip systems, gives a short analysis as to possibly spreading drip technology also to other Central Asian countries and closes with a marketing plan schedule as to what time of year it is best to market drip technology to farmers.
Chapter 5 gives a summary of the prospects of Kyrgyz or Chinese production or sourcing of parts of or entire low-cost DIS. This chapter should be read in connection with Appendix VII: Urumqi Mission Report, which adds important information about the possibilities of producing and procuring DIS in China generally and in Urumqi specifically. Both in Chapter 5 and Appendix VII recommendations are given how to proceed in the short-mid term.
Chapter 6 summarizes the defined challenges and how to tackle them by presenting a market plan schedule for which measures should be taken when in the short-mid term to put the Helvetas-IDE project on a solid foundation.
Chapter 7 concludes this report, summarizing the main facts identified during the internship. Additional necessary material that has been used for this report can be found in the Appendix.

2. METHOD OF THE STUDY

This report is based on a classical case study method aiming not to generate general scientific truths and generalizations by testing hypothesis or theories, but to study the specific context of Kyrgyzstan as to the goal of creating a sustainable market for low-cost drip irrigation systems.

As mentioned above the objective of this survey is to develop a market concept at all levels of the supply and value chain - from producer via wholesaler and retailer to the farmer - for the creation of a sustainable supply chain for drip irrigation systems in Kyrgyzstan.

Therefore the main task was the collection of data and identification of partners at each level through meetings, interviews, fieldwork and background research.

The objectives of the survey for each level of the supply and value chain are summarized in table 1.

Level of the supply and value chain	**Objective(s)**
Production	Identification of production capabilities both in Kyrgyzstan and China Identification of Chinese drip systems Analysis of profitability of local or Chinese production Price comparisons with import from India
Wholesale	Assessment of existing wholesaler Identification of potentially new wholesalers Analysis of opportunities and risks of cooperation as to supply chain and promotion issues Analysis of profitability of the sales of low-cost DIS
Retail	Assessment of existing retailers Identification of potentially new retailers Analysis of opportunities and risks of cooperation as to supply chain and promotion issues Analysis of profitability of the sales of low-cost DIS
Farm	Identification of most efficient and effective promotional activities and materials Assessment of profitability of the use of low-cost DIS

Table 1: Objectives of the survey for each level of the supply and value chain

For these objectives interview guidelines have been developed which can be found in Appendix VI: interview guidelines. Over a period of three months during spring 2011 around 40 interviews have been carried out with various stakeholders in the supply and value chain according to the above mentioned goals and the results summarized in the present report (see also Appendix II: interview summary).

3. CREATION OF A SUSTAINABLE SUPPLY CHAIN

Figure 1 shows a schematic diagram of a supply chain for DIS in Kyrgyzstan.

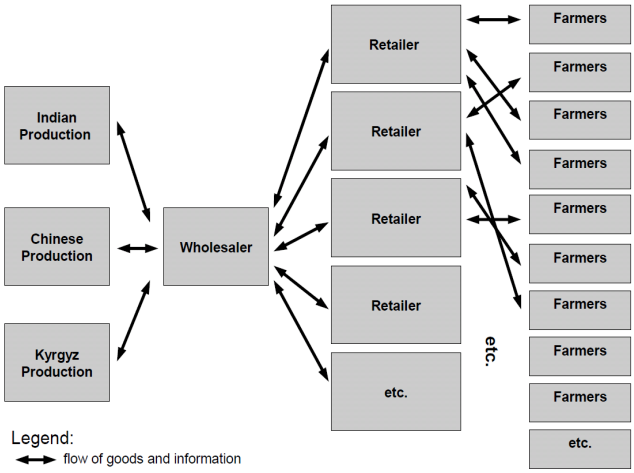


Figure 1: schematic diagram of a Supply Chain for DIS in Kyrgyzstan

Up to now the Helvetas-IDE DIS were exclusively imported from the Indian based low-cost micro irrigation manufacturer GEWP and distributed in Kyrgyzstan through ZOKI as a wholesaler and through the partners of the SEP-project of Helvetas and some commercial retailers in Osh, Jalalabad and Batken oblast.

In order that the market for DIS in Kyrgyzstan will be sustainable, it must be profitable for all the stakeholders in the supply chain. That is to say for the plastic producers, the wholesaler, the retailers and each individual farmer.

This chapter therefore presents the results of the interviews at each level of the supply chain – from production to farmer - as to the rationale with what partners it will be best to cooperate for Helvetas-IDE regarding their strengths and weaknesses taking into consideration profitability and sustainability concerns.

The chapter will be closing with a summarizing overview about recommendations how to proceed in the short-mid term.

3.1. Production

Since importation costs for Indian systems account for a high share of the final purchasing price (around 20%)[11] and importation takes up to three months after ordering, Helvetas-IDE project together with the private sector in the short-mid term must consider the option of (partial) local or Chinese production in order to be able to minimize purchasing prices and make drip available to each and every farmer segment.

Moreover since the sale and after-sale services of Indian based GEWP leaves a lot to be desired (incomplete compliance to orders, missing parts, quality and warranty issues and inexistent after-sale services), local or Chinese production should be considered and initiated as soon as possible.

Chapter 5: Manufacturing and Production in Kyrgyzstan presents the results as to the evaluation and assessment of Kyrgyz and Chinese production options of (parts of) low-cost drip irrigation systems for Kyrgyzstan. Moreover Appendix VII: Urumqi Mission Report gives an overview about what Chinese systems are presently available in Urumqi, indicating prices as well as production options in China.

Regarding sustainability and profitability concerns it has to be stressed that all stakeholders involved at the production level will produce parts of or whole DIS purely on market terms and for market prices; that is they will only produce for Helvetas-IDE and their partners if it will be profitable for them.

In case of Chinese or Kyrgyz production ex work prices will have to be negotiated with them at which a future wholesaler should closely be involved and participate. It will be important to compare prices offered and choose the cheapest options while at the same time being able to guarantee the quality.

[11] The imported container was half empty and the empty space subsidized by Helvetas-IDE, i.e. importation costs on market terms even account for a higher share in the final price.

Some Kyrgyz producers however might need financial and technical support regarding machinery and necessary raw materials.
For the analysis of local or Chinese production regarding opportunities and risks and recommendations how to proceed in the short run, please refer to chapter 5: Manufacturing and Production in Kyrgyzstan and Appendix VII: Urumqi Mission Report.

3.2. Wholesale

The wholesaler will play a key role in the future supply chain and a close and transparent cooperation with the Helvetas-IDE project will be essential.
The role of the wholesaler should ideally be taken by a commercial institution which is not only already acting as such and has the necessary infrastructure (administration and warehouse), but also is convinced about the advantages of low-cost, easy to use DIS and believes in its perspectives in Kyrgyzstan and in Central Asia in general. Only in that case in the future the company will invest its own resources in the creation of the supply chain.
However since low-cost DIS in Kyrgyzstan is practically unknown, considerable time- and monetary expenditures will be required to make the technology known and initiate the introduction phase of the market creation process (see Heierli, Katz (2007), 30ff). Therefore a future wholesaler in the short run needs most likely to be supported regarding promotional activities either because it initially considers the risk too great or it simply lacks the financial means to do so. However if the technology proves successful under Kyrgyz conditions, it will continue spreading with private sector money in the mid-, long-term.
Since the actual DIS have been imported from India importation costs into Kyrgyzstan account for a high percentage of the final purchasing price. If local or Chinese production will be initiated, several parts of a DIS will however need to be imported from either China or India; hence in the cooperation with a future wholesaler it is of high importance that the process of importation is reliable, responsibilities are clearly defined and the importation costs are - if possible - constantly reduced.
In the next section possible future wholesalers for low-cost DIS in Kyrgyzstan are presented and the opportunities and risks of cooperation evaluated. This is followed by an analysis of the profitability of the sale of low-cost DIS at wholesale level.

3.2.1. ZOKI

ZOKI as a non-profit organization started its activities in 2002 with the goal to overcome poverty and raise living standards in rural areas by organizing and conducting trainings and providing various partners with relevant information via mass media, trainings and seminars as well as through brochure, library and electronic means. The primary target group of ZOKI are regional centers of Rural Advisory Services (RAS), international and national NGOs as well as commercial organizations that ideally work directly with farmers and correspond to the ZOKI curriculum. ZOKI is active in the fields of livestock breeding, agronomy, processing, marketing and farm economics, methodology of consulting services, as well as specific topics such as for instance drip irrigation (ZOKI (2011)).
ZOKI is presently responsible for the management of the container with low-cost DIS imported from India and is storing most of the material in a little warehouse outside of Osh in the South of Kyrgyzstan.
ZOKI actually has 170% workforce staff paid by SEP-project responsible for the project in general and the management of the wholesale of the imported DIS specifically.
After receiving orders from retailers, ZOKI staff goes to the specific plots of the interested farmers, draws an installation scheme and calculates the wholesaling price for the retailers.
At present ZOKI staff - with the exception of some retailer staff - is the only people in Kyrgyzstan having enough technical knowledge in order to install and maintain DIS and give reliable advice as to its advantages and disadvantages.
ZOKI does not have much experience regarding commercial activities and also only has limited capabilities in this respect (e.g. employees, infrastructure and know-how). Moreover it is not clear if ZOKI at all has a mandate for commercial activities. It is thus likely that ZOKI already in the near future will work in a more consulting and advisory function focusing on tasks such as training of trainers, preparation of manuals and assistance of retailers. Since these tasks are at the moment supported by SEP-project, it will be crucial to integrate these services in the pricing system of the DIS technology in order to make the whole supply chain sustainable.
It has to be stressed however that the imported low-cost DIS from India are quite simple in its installation, handling and maintenance and only certain principles need to be followed, which can be subsumed in a manual for retailers that should be developed by ZOKI staff. As soon as the technology spreads over the country, more and more people will become qualified regarding easy to use drip technology.
Last but not least it has to be stressed that ZOKI will not invest its own resources into the spread to drip technology in Kyrgyzstan, but will only invest according to mandates received by organizations and project such as Helvetas-IDE.

3.2.2. Seagulls International Ltd.

Seagulls International Ltd. is an Indian-Kyrgyz joint venture which is selling Indian, Chinese, Egypt and Pakistan made agro inputs allover Kyrgyzstan. Actually they are selling sprayers, irrigation tanks, fertilizers, stimulators, pesticides, herbicides and have a sales turnover of around 3 million US$ yearly. Their director is Indian and speaks Russian and they have an actual staff of around 40.

Seagulls International Ltd. has its headquarters in Bishkek and is mainly active in Kyrgyzstan. However they also have a branch in Khujand, Tajikistan and plan to open a branch in Tashkent, Uzbekistan as well.

In Kyrgyzstan Seagulls has offices as well as warehouses in Talas, Osh and Leilek and before the 2010 overthrow of the Kyrgyz government it also had branches in Karakol and Naryn, which it had to temporarily close down and is planning to reopen as soon as possible.

Seagulls is importing both from China and India on a regular basis. Their transportation costs and delivery times are summarized in table 2.

Cost of importation	**Delivery times**
India: 20 feet container: 4'200 US$	60 days
India: 40 feet container: 6'500 US$	60 days
China: 20 feet container: 7'500 US$	20 days
China: 40 feet container: 9'500-10'000 US$	20 days

Table 2: importation costs and delivery times of Seagulls Int. Ltd for China and India

If SEP-IDE plans to continue importing whole or parts of DIS from India, close cooperation with Seagulls would offer the opportunity to profit from their sales experiences and from their Kyrgyz-Indian network to source in and import from India. For instance considering the unsatisfactory experiences with GEWP India (missing parts, quality problems, inexistent after sales services), a collaboration with Seagulls would offer the opportunity to source individual parts of an Indian made DIS directly at the production sites in Maharashtra, India. Seagulls has already established contacts with Indian drip manufacturer Naan Dan Jain Irrigation Ltd. (www.naandanjain.com) in order to check import opportunities to Kyrgyzstan with them.

Moreover Seagulls has established contacts in China, especially in Shanghai, Beijing, Guangzhou and Shenzhen and is experienced in the importation procedures from China to Kyrgyzstan.

Seagulls sees a high potential for low-cost drip irrigation in Kyrgyzstan and would be ready to act as wholesaler. Seagulls believes in and already applies the approach of designing a product as simple as possible to keep costs down while at the same time guaranteeing the quality. However they expressed that low-cost drip irrigation technology needs to be first tested in depth under Kyrgyz conditions as to its advantages and risks and is skeptical as to the quality of the presently imported DIS by Helvetas IDE.

It has to be stressed that in case of cooperation with Seagulls International Ltd. they will also sell DIS directly to the farmers. Seagulls Ltd. already has its network of agro shops in many parts of Kyrgyzstan and there is thus a risk that they will be reluctant to sell DIS to other retailers or will be selling them at higher prices. In this way the spread of the technology in the short run is risking to slow down. This will have to be closely watched by Helvetas-IDE and at best should already be tackled at the beginning of a possible cooperation during negotiations.

Nevertheless Seagulls International Ltd. seems to offer the most prospects at wholesale level. With its network of warehouses Seagulls can not only guarantee the coverage of whole Kyrgyzstan but also quicker delivery times and the option to expand into the Tajik part of the Fergana valley via its branch in Khujand (see also below expansion to other central Asian countries).

If Helvetas-IDE does not choose to cooperate with Seagulls as a wholesaler, their commercial experiences and network should be anyhow used incorporating them in the supply chain as a retailer.

Seagulls certainly offers the opportunity to become a sustainable and independent, long term supplier of low-cost DIS in Kyrgyzstan and most importantly is ready to invest its own resources in the spread of drip technology in Kyrgyzstan.

3.2.3. Agroline Ltd.

Agroline Ltd. is a branch of TES Centre Osh which is a public foundation offering various services in the field of agriculture, such as microfinance, education and advisory services, processing and trading, etc.

Agroline Ltd. was founded in 2008 with their office in Osh and has four employees, two managers and two administrative staff. It

is active in three branches/directions:

1. supply of mineral fertilizer and seeds
2. agricultural advisory services
3. trade of Kyrgyz made agricultural goods locally and abroad.

Agroline as an agro input supplier has its focus in the South of Kyrgyzstan with warehouse capacities in Osh. Agroline has experience in sourcing material and goods in Russia and Central Asia. Agroline is a dynamic commercial organization with a network of around 1'000-1500 farmers that are reliable, business and growth orientated. The company has a sales turnover of around 2 Mio KGS (~45'000 US$), but up to now has not been profitable. After the June events in Osh in 2010 they fell into bankruptcy with a deficit of 1.2 Mio KGS. The losses then were covered by TES Centre.

Via the microfinance branch of TES Centre Osh, Agroline is able to sell DIS on credit (Agrocredit Plus) at around 28% annual interest.

Agroline sees a high potential for drip irrigation in Kyrgyzstan and would be ready to act as wholesaler for low-cost DIS. However they have some concerns regarding the quality of the systems and are thus interested in becoming a supplier of various brands and systems, i.e. low-, medium- and high cost.

Agroline expressed that drip irrigation technology in Kyrgyzstan is up to now practically unknown and therefore needs to be accordingly promoted. They suggest demonstrational plots, field days and TV programs as well as TV spots to achieve this. Agroline needs financial support for promotional activities and materials.

If Helvetas-IDE does not choose to cooperate with Agroline as wholesaler, their commercial experience and network can be anyhow used incorporating them in the supply chain as a retailer.

If Agroline sees potential for drip technology in Kyrgyzstan, they will be ready to invest their own money into the creation of a supply chain and may be supported by TES Centre Osh.

Table 3 gives an overview about the assessment and comparison of Seagulls, Agroline and ZOKI.

Characteristics	**Seagulls International Ltd.**	**Agroline Ltd.**	**ZOKI**
Main products, services	Sprayers, irrigation tanks, fertilizers, stimulators, pesticides, herbicides	Mineral fertilizers, seeds, agricultural advisory services, (international) wholesaling of agricultural goods	organizing and conducting trainings, provision of agricultural information in the fields of livestock breeding, agronomy, processing, marketing and farm economics, methodology of consulting services, as also specific topics such as drip irrigation
Sales turnover	3 Mio US$	2 Mio KGS	Unknown
No of clients	Unknown	1'000-1'500	Partner network of SEP
Sales area	Kyrgyzstan, Tajikistan, Uzbekistan	South of Kyrgyzstan	allover Kyrgyzstan
Location of warehouse	Talas, Osh, Leilek, Karakul, Naryn,	Osh	Osh, Bishkek
Promotion	Demo plots, field days, mass media	Demo plots, field days, mass media	Only through the partner network of SEP
Microfinance	No, can be linked to existing microcredit institutions	Yes, around 28% annual interest	No
Strengths	• well established and profitable • involved in Kyrgyz-Indian- Chinese trade • option to expand into Tajikistan and	• Already established partner of the SEP-project • Ready to invest own resources in the spread of drip	• Know-how about the actual DIS • Established contacts to retailers

	Uzbekistan • already investing own resources in the spread of drip technology	technology	
Weaknesses	• New partner of SEP project • Risk of short term monopoly	• Up to now not profitable • Need financial support for promotional activities	• No commercial experiences • Need financial support for promotional activities • Will not invest own resources in the spread of drip technology

Table 3: overview and comparison of Seagulls, Agroline and ZOKI

3.2.4. Profitability at Wholesale Level (contains some confidential information)

It has to be assured that the wholesaler's margins are high enough right from the beginning in order that it is beneficial for them to stay in the business. The margins of wholesalers depend on various factors:

- Location of production: Kyrgyz (normal or within a special economic zone, i.e. Bishkek Free Economic zone) or International
- amount of initial investments, i.e. return on investments and time horizon
- sales volume
- total costs of a good
- weight of a good
- etc.

It is thus usual for wholesalers to have different margins for different goods. Generally it can be said that the range of margin for different goods is between 15 to 30%.

In cooperation with Agroline Ltd. different scenarios of minimum yearly sales turnover have been assessed regarding total costs and the profitability of different margins of imported Indian low-cost DIS at wholesale level.

Table 4 summarizes the approximate yearly total fixed costs of Agroline Ltd.. Table 5 further defines necessary yearly sales turnover in KGS and hectares of DIS sold as to different margins in order for Agroline to be profitable.

As seen in table 4 Agroline has yearly total fixed costs of around 778'000 KGS (around 17'000 US$).

Variable costs such as for customs, loading, cleaning and local transportation in Kyrgyzstan are not included in the table since they can be fair according to the input involved allocated to the different DIS and thus be included in the wholesalers price. Moreover in this example it is assumed that the retailers themselves are responsible for the transportation costs from the warehouse to the farmer's field, i.e. Agroline would sell the DIS ex warehouse.

Agroline Ltd.	**Costs in KGS**	**Remarks**
Salaries	528'000	Yearly salaries for two full time managers and one full time accountant
Rents	70'000	For offices and warehouse, Agroline has especially cheap office expenses because of its partnership with TES Osh.
Administrative costs	30'000	Telephone, Internet, Computers, Office materials

Promotion	50'000	Assumed to be double the budget the retailers presently get from the SEP-project for promotional purposes.
Various expenses	100'000	e.g. for vehicle, miscellaneous, amortizations
Total yearly fixed costs	**778'000**	

Table 4: Approximate yearly total fixed costs of Agroline Ltd.

Agroline's Margin	**Minimum necessary sales turnover for Agroline Ltd**	**Number of hectares covered with DIS assuming the actual sales prices and figures of ZOKI (May 2011: 87.5% orchard and 12.5% vegetable systems sold)**
10%	7.78 Mio KGS	Total 62.25 ha (54.5 ha orchards, 7.75 ha vegetables)
20%	3.89 Mio KGS	Total 31.1 ha (27.3 ha orchards, 3.8 ha vegetables)
30%	2.593 Mio KGS	Total 20.7 ha (18.1 ha orchards, 2.6 ha vegetables)

Table 5: Minimum necessary yearly sales turnover for Agroline, expressed in KGS and hectares

Up to present in total only 20.2 ha of DIS have been imported from India and are ready for sale in Kyrgyzstan. By May 26, 2011 ZOKI has sold a total of 2.01 ha, 87.5% of which for orchard and the remaining 12.5% for vegetable production.

Regarding the results presented in table 5 it has to be stressed that these figures are only valid in case that Agroline would exclusively focus its sales activities on drip irrigation systems. However as seen above, Agroline is presently working within three branches (supply of mineral fertilizer and seeds, agricultural advisory services and trade of Kyrgyz made agricultural goods locally and abroad) and thus considers the sale of DIS only as an additional branch, yet offering high potential in the mid term.

Also ZOKI and Seagulls will not rely exclusively on the sales of DIS in order to be profitable or at least in order to be able to present a balanced budget. Seagulls is selling a wide range of various products generating income and ZOKI has the support of donor money.

Agroline also indicated that a strategy might be to sell initially whole systems at a lower margin of around 10% in order to spread the technology and later provide DIS users with spare parts at higher margins of around 30%.

Nevertheless in short in the mid term the goal at wholesale level has to be to generate as high sales turnovers as possible in order to keep the margins as low as possible and therefore being able to sell at lowest possible prices to the retailers.

3.3. Retail

Retailers build the crucial link between a wholesaler and the final customers. They will not only be responsible for the sales of DIS, but also for its installation and maintenance and in case of warranty issues will be the front office for farmer's complaints. Furthermore especially in the introduction phase of the market creation process retailers will be the ones to identify first potential customers, i.e. innovators and early adopters that are willing and able to take some risks and try out low-cost DIS on their fields. Therefore retailers will need some knowledge about the advantages of drip irrigation in general and how to install and maintain DIS specifically.

Generally in the retailer's point of view the potential for low-cost DIS and the interest of farmers in drip irrigation in Kyrgyzstan is considered as high or very high. However since the technology is not known, demonstrations of low-cost DIS need to be installed.

Only if retailers believe in the perspectives of DIS in their region and notice the financial benefits that emerge for them, they will

start invest their own resources in the promotion of low-cost DIS. Nevertheless at the introduction phase of the market creation process, retailers will need to be supported regarding promotional activities by the Helvetas-IDE project.
Since different kinds of retailers are supposed to sell DIS, they are presented in the next section and opportunities and risks of cooperation evaluated. This is followed by an analysis of the profitability of the sale of low-cost DIS at retail level.

3.3.1. Commercial Retailers

Commercial retailers that are interested in low-cost DIS should be included in the supply chain. They know the needs of their clientele, are trusted by them and are well integrated in their local community. Moreover they have the infrastructure, commercial experiences and if they notice that selling DIS is profitable, they will not sit on the goods and wait until someone comes to buy. Commercial retailers do not have any financial project or donor support. The goal in the mid term is that they actively search for new customers and promote the product themselves.
The acquiring of commercial retailers is a labor- and time-intensive task in the first stage of supply chain development, but is inevitable in order to build up a sustainable supply chain, in which the retailers - out of their own financial interest - play the role of the important link between the wholesaler and the final customers. However once a private company is managing the wholesale, it is not necessarily the Helvetas-IDE project anymore who has to identify retailers. The wholesale company will use its existing retail-network for disseminating the DIS technology and possibly take over contacts that have been established by the project.
Actually there are two retailing partners included into the supply chain of low-cost DIS which have a commercial background: Agrosoovetservice and Agroline.

3.3.2. Agricultural Service Providers

A network of 8 partners of the Efficient Use of Water Project SEP of Helvetas build at present the core of the retailing system, since they are long term partners of the SEP project of Helvetas: They were the first ones who were trained on DIS and tested and demonstrated DIS technology in 2004 and 2009 in Kyrgyzstan. Helvetas decided to invite these partners as retailers to start the market test phase since they already handle the technology.
They know their farmers and for which farmers it is best to use DIS. Moreover some of the SEP-partners have a microfinance and commercial branch as well.
However many agricultural service providers are non-profit organizations and do not have a commercial background and experiences in sale and marketing activities. They are supported by donor money and their core business is training and consulting of farmers and not sales of agro inputs. It is therefore suggested that cooperation with these partners and also potentially new agricultural service providers is continued and even extended under the condition that they show interest and are actually selling DIS.
Agricultural service providers are crucial in the first phase of the supply chain development to conduct demonstrational and promotional activities and some of them are planning to open agro input sales branches as well (e.g. RAS Jalalabad).
In the mid term SEP-partners and NGOs will probably focus on consulting and advisory services regarding DIS. The challenge will however be to integrate their services into the supply chain: Who will pay the service providers for their demonstration, installation and maintenance services? The wholesaler, retailers or the farmers? Which payment system should be used? Embedded services or paid services?
This part of the supply chain needs further investigation and conceptual development (see also chapter 4.1.4. Product: Supporting Services (Technical Support)).
As mentioned many of the SEP partners are having a not for profit, social background and do not have many or any sale experiences (RAS Batken, RAS Jalalabad, RAS Osh, PF Mekr-Shavkat, PF Bio-Service, PF DCCA).
However these NGOs and Public Foundations are well integrated into their local or regional context and therefore well suited to determine innovative farmers and conduct promotional activities. And once they notice that selling low-cost DIS is profitable, they most likely will continue doing it.
Furthermore it has to be stressed that most of the infrastructure and administrational costs of these service providers is paid by project/donor money (Comment by Lydia Plüss, program manager SEP: "This is not true. They have to cover their fixed costs through mandates given by donors").
Therefore they will always have lower fix costs and thus may also need lower margins than commercial retailers that are financially independent. This is unfortunate as to sustainability concerns of the overall market, but fortunate for the farmers that want to buy a DIS as cheap as possible.

3.3.3. Cooperatives

Cooperatives give the opportunity to demonstrate DIS and also organize the sales of it, since some of them have a commercial branch selling agro-inputs to their member-farmers. Cooperatives are often supported by donor money.

Cooperatives know the needs of their farmers and can identify the ones for whom DIS are beneficial and may act as innovators and opinion leaders. Depending on the type of cooperative (input-oriented or production oriented), they can act as retailers or as promoters for DIS.

Cooperatives therefore are a good stepping stone to reach many farmers simultaneously.

Up to now no cooperatives have been included into the supply chain.

Table 6 gives an overview about the strengths and weaknesses of different retailers.

Characteristics	**Commercial retailers**	**Agricultural service providers**	**Cooperatives**
Microfinance (providing or having access to microfinance)	No	Yes	Yes
Strengths	• Knowledge of local conditions • Sales and marketing experiences	• Knowledge of local conditions • Experience in demo plots and conducting field days • Access to remote areas • Most experienced as to low-cost DIS compared to commercial retailers and cooperatives • Donor supported regarding fix costs	• Knowledge of local conditions • Experience in demo plots and conducting field days • Access to remote areas • Wide network all over the country
Weaknesses	• Lack of know-how and knowledge about low-cost DIS • Financially independent, i.e. fixed costs	• Lack of sales and marketing experience	• Lack of know-how and knowledge about DIS

Table 6: Assessment and comparison of commercial retailers, agricultural service providers and cooperatives

3.3.4. Profitability at Retail Level

It has to be ensured that retail margins are high enough right from the beginning in order that the financial incentives for retailers are high enough that they want to promote and sell low-cost DIS.

However it will be most straightforward not to fix a final purchasing price, but to leave this up to the retailing partners and only advise them in this regard. Retailers therefore would pay an ex warehouse price to the wholesaler and decide the final sales price themselves.

In the mid term it will be the retailers with the highest sales turnovers that are able to offer the lowest prices i.e. that need the lowest margins. It is therefore very likely that a concentration process will take place. As seen above donor or project supported retailers are having a head start, since they are not required to cover all of their fix costs.

To guarantee the delivery of low-cost DIS also to more remote places and to small holder farmers, Helvetas-IDE project will very likely need to support and convince agro shops, cooperatives and agricultural service providers to demonstrate, deliver and sell the systems also in such places at least at initial stages of the market creation process. In the mid-long term it has to be stressed however that if retailers will see a market potential in remote places they will very likely also start marketing low-cost

DIS there. Besides once knowledge about low-cost DIS will have spread and farmers in remote areas will find out about the product and consider it useful and beneficial, they will themselves come to central places where low-cost DIS are available.
Analogically as at wholesale level at retail level margins depend on various factors:

- sales volume
- location of purchase: within Kyrgyzstan or internationally, at wholesale or at retail level, i.e. number of middlemen
- weight and size of a good
- transportation and delivery costs
- etc.

It is thus usual for retailers as well to have different margins for different products. Generally it can be said that the range of margin of commercial retailers for different goods is between 10 to 50%.
Assuming that only low-cost DIS are being sold by a retailer different scenarios of minimum necessary yearly sales turnover have been assessed regarding yearly total fixed costs and the profitability of different margins at retail level.
Table 7 summarizes the approximate yearly total costs of a hypothetical retailer, based on figures received during interviews with various retailers.
Table 8 further defines necessary yearly sales turnover in KGS and hectares of DIS sold as to different margins in order for such a retailer to be profitable.
As seen in table 7 a hypothetical retailer with one manager fully employed for the sales and one accountant has approximately yearly total fixed costs of around 440'000 KGS (around 9'500 US$).
Variable costs such as for local transportation and installation of the DIS are not included in the table since they can be fair according to the input involved allocated to different DIS sold and thus be included in the final purchasing price. Moreover it is assumed that farmers might buy a system right at the sales office of a retailer and install the systems themselves, which is especially likely in the case of smaller systems.

Hypothetical Retailer	**Costs in KGS**	**Remarks**
Salaries	300'000	Yearly salaries for one full time manager and one full time accountant
Rents	50'000	For a sales place and maybe little warehouse
Administrative costs	15'000	Telephone, Internet, Computers, Office materials
Promotion	25'000	Budget line the retailers presently get form the SEP-project for promotional purposes, including expenses for transportation and
Various expenses	50'000	e.g. for vehicle, miscellaneous, amortizations
Total yearly costs	**440'000**	

Table 7: Approximate yearly total fixed costs of a hypothetical retailer

Retailer's Margin	**Minimum necessary sales turnover for a hypothetical retailer**	**Estimated number of hectares covered with DIS given the actual wholesale prices and sales figures of ZOKI (May 2011: 87.5% orchards and 12.5% vegetables)**

10%	4.4 Mio KGS	Total 32 ha (28 ha orchards, 4 ha vegetables)
20%	2.2 Mio KGS	Total 14 ha (12 ha orchards, 2 ha vegetables)
30%	1.46 Mio KGS	Total 9 ha (7.8 ha orchards, 1.2 ha vegetables)

Table 8: Minimum necessary yearly sales turnover for a hypothetical retailer, expressed in KGS and hectares

Regarding the results presented in table 8 it has to be stressed that these figures are only valid in case that a hypothetical retailer would exclusively focus its sales activities on drip irrigation systems and as to the numbers of hectares it has to be kept in mind that variable costs such as for delivery and installation are not included here. If they were included the number of hectares covered would decrease.

As seen above identified retailers are either supported by donor money (cooperatives and agricultural service providers) or for the commercial retailers have various business activities which pay for fixed costs.

Retailers thus consider the sale of DIS only as an additional branch, yet offering high potential in the mid term.

Also at retail level a strategy might be to sell initially whole systems at a lower margin of around 10% in order to spread the technology and later provide DIS users with spare parts at higher margins of around 30%.

Last but not least the mid term goal has to be to generate as high sales turnovers as possible in order to keep margins as low as possible and therefore being able to sell at lowest possible prices to the farmers.

3.4. Farmers

Out of the almost 20 million hectares of total area in Kyrgyzstan, 9 million hectares are mainly extensively used as meadows and pastures, and only 1.3 million hectares is arable land. 0.9 Million hectares are well irrigated, intensively used and therefore considered economically important. However the main reasons for land not being plowed and intensively used are (growing) problems of access to irrigation water.

In 2009 a study from Agroline showed that 65% of the not cultivated land was not used due to lack of irrigation water. (Agroline (2010), 4)

In the same study – containing 120 interviews with farmers in the south - it is indicated that a household in the South of Kyrgyzstan has in average a little more than one hectare of plowed soil, growing cereals (~60%), cotton (~7%), tobacco (~3%), potato (~6%), vegetables (~4%) and fruits and berries (~5%).

These lands are mainly irrigated by channels and wells, which are usually located about 200 meters away from the plots. Nevertheless practically all respondents mentioned problems of water deficiency for irrigation, which is sometimes the cause for conflicts during the dry season and farmers have to grow low profitable crops which need less water.

Moreover farmers have little knowledge about more efficient technologies of irrigation and as a result there is a big interest to get information and consultation on accessible and efficient irrigation technologies, including low-cost DIS.

Over 5 % of interviewed farmers were immediately ready to invest their finances in small low-cost DIS in order to try the technology. (Agroline (2010), 5ff)

As already mentioned in the introductory part drip irrigation in Kyrgyzstan can be used for the following purposes:

- Preservation of existing, mostly rain fed orchards where due to various reasons water is getting scarce
- Exploitation of new fields for orchard or vegetable plantation which so far lied idle due to lack of water
- Augmentation of irrigation water efficiency on existing plots (orchards and vegetables) where it is burdensome and expensive to irrigate due to its location
- Irrigation inside greenhouses

It has to be stressed that the imported Indian DIS are mainly foreseen for farmers marketing their crops and only secondary for subsistence agriculture and home gardening. This is especially true for the introduction phase of the market creation process. Once the technology is introduced small holder, poorer farmers will possibly adopt it for home kitchen farming in remote areas.

As to the potential of DIS for the exploitation of new fields for vegetable plantation it has to be emphasized that farmers presently cultivating and marketing various vegetables are doing this in well irrigated areas where there is no lack of water. Thus drip technology needs to first be popularized and prove its practicability in general before even innovative farmers will start using it for the cultivation of vegetables in so far unused fields.

At the present introduction phase of the market creation process typical farmers that are buying the technology are “innovators”

who like to be pioneers. They are risk-takers, enterprising people, comparatively better-off and unlike poorer small holders who are (and have to be) much more cautious and conservative.

Pioneer farmers may travel around, visit research stations and field days and may want to try out things for themselves. They have a high curiosity level.

Also in the present introduction phase the first early adopters will likely buy the technology. Early adopters are lead farmers who are interested in innovations once they have seen it working with an innovator. Their curiosity level is also high and they may be – moderate – risk takers too. Typically they would say: "if s/he can do it, I can do it as well."

In the mid term in the maturation phase of the market creation process more mainstream customers will be targeted, i.e. the early majority of farmers should be buying the product, thus generating higher (profitable) sales turnovers. Early majority farmers may be farmers who would like to try drip technology, provided it does not involve too much risk. Typically such farmers would ask: "show me a farmer whom I know and who has done it successfully."

In the long term in the saturation phase of the market creation process a large part of the potential drip users are reached by promotion and served by retailers. It is exactly in this phase where the late majority and even laggards are being reached and will adopt a new technology, if at all.

Late majority farmers tend to be poorer and thus have less capacity to absorb risks. Typically such a farmer would ask: "Can I be sure that somebody like me can use it without risk?"

Helvetas-IDE from a poverty reduction point of view for Kyrgyzstan needs to reach and convince exactly this late majority to use low-cost DIS. However as already mentioned this will only be possible in the mid-long term, once the technology has been popularized.

Laggards are farmers who – for whatever reason – are averse to any risks and changes, yet mainly due to a fatal financial situation. For the development of a sustainable supply chain they may be ignored since the effort to convince them is too big compared to the profit to be made if they adopt low-cost DIS. However from a poverty reduction point of view, laggards should at least be targeted by promotional activities.

(Heierli, Katz (2007), 30ff)

Regarding the prices of low-cost DIS it should not be neglected that its utilization also requires additional expenses, for example for a water reservoir or the fencing of a plot. Also, the required labor input should be considered. In the beginning, operating a drip irrigation system needs a lot of attention and fine-tuning, especially for the presently imported systems, since they are less stable and not buried into the ground. Moreover shortage of labor is an important factor in agriculture in Kyrgyzstan, since many young men migrate to Russian and leave field work to elderly people, children and mostly women.

Farmers that have experience with low-cost drip irrigation systems imported from India and tested in 2009 with tomatoes expressed following positive effects:

- Yield increase, 50-250%
- Saving of water, 250-600%
- Savings of labor, 600-800%
- Savings of fertilizers 200%
- Savings of electricity for water pump
- Less diseases and pests, i.e. savings of herbicides, pesticides and fungicides
- Higher market prize due to better crop quality around 15%

(ZOKI (2009), 2ff)

The aggregate effect of these positive impacts will certainly make low-cost DIS profitable for various farmers in Kyrgyzstan and can guarantee for high enough returns on investment in order to pay a DIS back within one to two years.

Furthermore in the mid-term the accumulation of experiences collected on various plots with various crops using DIS in Kyrgyzstan will allow getting a more accurate picture about its profitability.

It has to be stressed that also the life span of these systems under Kyrgyz conditions are so far unknown. In India laterals (250 micron) of low-cost DIS of the same manufacturing may last up to five years and other parts, such as filters, valves, main tubes, etc. may even be used up to 10 years.

Last but not least rising price levels for agricultural food products may speed up the process of introducing low-cost DIS in Kyrgyzstan by giving further economic incentives to farmers for example to open up and cultivate on plots that up to now lie fallow.

3.5. Recommendations

At production level it is suggested that the option of local or Chinese production are postponed until the evaluation of the sales season 2011. If these results show a high probability that demand will pick up in 2012, production options both in Kyrgyzstan and China should be followed up. Parts to focus on are mostly tubes (for more details please refer to chapter 5: Manufacturing and Production in Kyrgyzstan and Appendix VII: Urumqi Mission Report). This should be done in close cooperation with a future wholesaler.

At wholesale level all three institutions interviewed as possible wholesalers offer both opportunities and risks and in the event of cooperation have both strengths and weaknesses of various kinds. At this stage it is difficult to pinpoint the best wholesaling partner for Helvetas-IDE and probably would also not make too much sense, although Seagulls International Ltd. seems to offer the most advantages.

It is suggested that in case of a second import from India or China there should be an open call for tender asking all potential wholesaler to submit a business concept. The company with the best business concept would then get the 2nd container for management. The conditions and requirements for this call for tender should be clarified as quickly as possible and made public (see also Appendix III: Market Concept Schedule).

However if meanwhile parts of a drip system will be need to be imported either from India or China, it is suggested that this is done via Seagulls or at least this option checked with them. Not only do they have most experiences in this regard, but importation via them would also allow checking their way of cooperation with Helvetas-IDE.

Regarding the terms of cooperation with a future wholesaler with the Helvetas-IDE project – i.e. possible establishment of a drip fund, different ways of support, etc. – and the handing over of the wholesale responsibility from ZOKI details will have to be clarified as quickly as possible, that is still in 2011 (see also Appendix III: Market Concept Schedule)

At retail level all identified partners offer both opportunities and risks and in the event of cooperation have both strengths and weaknesses of various kinds. At this stage it is thus difficult to pinpoint the best retailing partners for Helvetas-IDE and probably would also not make too much sense. It is therefore suggested that at the end of the sales season 2011 all retailers should be assessed regarding their performance and terms of cooperation and support conditions for the sales season 2012 specified.

The focus in 2012 should certainly lie on the retailers that sold most systems in 2011 and main reasons should be identified why some retailers were not able to sell much in 2011. (see also Appendix III: Market Concept Schedule), not only because of efficiency concerns regarding the project means, but also because they will be able to keep the margins lower as retailers selling only a few systems a year.

In order to guarantee that low-cost DIS are also available in more remote places in 2012 and to small holder farmers Helvetas-IDE project will need to assess and identify retailers also in this respect and negotiate necessary terms of cooperation.

Regarding the up to now limited knowledge of the retailers about drip technology in general and low-cost DIS specifically a manual for retailers should be developed by ZOKI staff in which detailed information regarding the promotion, sales, installation and maintenance is presented and necessary contact information provided. All available drip systems both Chinese and Indian should be presented in this manual. This retailer's manual should be continuously updated regarding newly arising requirements and newly accumulated data and information included.

Contacts with cooperatives in Kyrgyzstan should be established and low-cost drip irrigation technology made known to them by providing them with the retailer's manual.

Last but not least, since it is not planned to determine final purchasing prices for the DIS, but leave this matter up to the retailers, a competitive market incorporating enough market players has to be guaranteed.

At farmer level it is important that still in 2011 as many as possible innovative farmers are identified by the retailing partners and start using the technology. Therefore also during the field days it has to be guaranteed that as many as possible interested farmers are invited and get acquainted with the technology. It should be ensured that first mover-farmers are closely followed as to their experiences with the technology and especially as to problems that occurred. If problems occur, reliable advice and possibly spare parts must be quickly delivered.

Specific advantages of the use of DIS under Kyrgyz conditions should be documented and included in the promotional materials for 2012.

Materials that have been imported from China in June 2011 – especially various drippers and laterals – should be sold and installed on fields in order to test the quality and practicality and to compare them with the Indian systems (see also Appendix III: Market Concept Schedule).

4. PROMOTION AND SPREAD OF KNOWLEDGE ABOUT DRIP IRRIGATION

4.1. The four Ps of Marketing

Drip irrigation is up to present is a marginal phenomenon in Kyrgyzstan and there have been only few attempts to introduce drip in the country. USAID projects had drip components, Netafim an Israeli based high cost drip irrigation manufacturer had a branch office in Bishkek, but closed their activities after a couple of years and from time to time other systems, e.g. from Turkey or China show up. Yet altogether presently there is no drip technology utilized on a wider scale.

People do know about the technology, but often associate it with high costs and difficulties of installation and maintenance. Many are then surprised by the simplicity and by the low-costs of the DIS imported by Helvetas-IDE.

Drip irrigation in Kyrgyzstan is typically seen as a product for the developed world, which is expensive and difficult to handle. Therefore to make it affordable and simple will also make it attractive for farmers in Kyrgyzstan.

Spreading the knowledge about drip irrigation in general and about the imported low-cost DIS specifically is costly and resources will be easily wasted if it does not reach its target audience and if it does not lead to increased sales within a reasonable time.

Generally promotion is more than advertising, it implies a two-way communication with the customers. People do not primarily want drip irrigation equipment but reliable irrigation for their crops over the whole growing season. The product to be promoted is thus “reliable irrigation” and not “drip irrigation equipment”. (Heierli, Katz (2007), 38)

High volumes of DIS sales will only be achieved with a reliable marketing strategy. The well-known four Ps of marketing will act as guidance for defining such a marketing strategy.

Product:	What is the product or service to be sold?
Price:	How much does the product cost?
Place:	Where is the product sold?
Promotion:	How is the product made known?

Figure 2: The Four Ps of marketing

As already mentioned in order to reach poorer, small holding farmers in Kyrgyzstan, drip irrigation technology in general has to be first popularized. For the Helvetas-IDE project this will only be possible by targeting at the beginning innovative farmers that are able to take some risks and try out the presently imported DIS on their plots. Only in a second step then the technology can be successfully marketed to all remaining customer segments including poorer small holders.

4.1.1. Product: Quality

Since many farmers come the first time across low-cost DIS not only the simplicity of its installation and maintenance has to be guaranteed, but also the quality.

It is of high importance that the imported DIS will not get the image of a low-cost, low quality and impractical product that is devised and diffused by international aid agency office staff that does not know the conditions on the field. Therefore installations especially for demonstrational purposes should not be hasty and the quality needs to be guaranteed in order not to risk failures and spoil the reputation. Moreover the branding of low-cost DIS should be associated with the private sector and not with aid organizations, since private companies have most likely own money invested, which they do not want to risk selling bad quality.

It is unfortunate that the small kits for 200 square meters are coming with 125micron laterals and not with 250micron laterals as the remaining imported systems. As several such systems are presently being sold, farmers need to be informed that bigger systems come with higher quality laterals, providing a longer life span. However in June 2011 4000m of two different Chinese made drip laterals were imported that are of higher thickness for around the same price and thus should also be sold to farmers in 2011 (see also Appendix VII: Urumqi Mission Report).

Since it turns out that there are also other quality concerns (especially leaking valves), these will have to be closely followed and defect parts without hesitation replaced.
In general demonstrational plots will therefore not only act for promotional purposes, but also to check the product and to identify possible shortcomings.
It is furthermore important to bring to light the approximate life span of a DIS under Kyrgyz conditions. Only in this way profitability calculations can be clarified (e.g. return on investments).
In short it is important that there are quickly as many as possible DIS installed and exhaustively tested in order to gain valuable insights as to quality and profitability concerns and at the same time serving promotional purposes. However the bigger the number of demos, the less it is possible to guarantee the quality with the available project resources (funds). Thus fewer demos, managed by motivated farmers who invested their own money are better than many subsidized or "pushed" demos. A balance has to be found.

4.1.2. Product: Warranty

Warranty for a DIS is presently given for a period of 12 months after the date of purchase against manufacturing deficiencies and degradation because of sun radiation. This is supposed to be in accordance with the guarantees and the warranty given to the wholesaler in Kyrgyzstan by the Indian supplier GEWP. However since it turns out that there are some ambiguities in the cooperation with GEWP as to warranty issues, these should be clarified.
Furthermore Chinese made spare parts that fit the actual Indian systems can be used in case GEWP is not ready to replace broken parts in time, e.g. 16mm take off valves.
A possible expansion of the warranty up to two or three years may be considered since this would reduce the risk for the farmer to purchase the DIS. However IDE up to now did not provide more than a one year warranty on any of its products promoted in any project worldwide.
Each system is delivered with a warranty card. These warranty cards will also act as primary information to analyze the market of drip irrigation and gain valuable information about the customers and the demand.
Regarding warranty the terms should be clarified in close cooperation with a future wholesaler and in case of local or Chinese production with possibly new plastic producers as well. However Urumqi based drip system suppliers are not ready to guarantee for a one year period. It is therefore very likely that a future wholesaler will need to take on the warranty responsibility and thus include the costs for it in its margin.

4.1.3. Product: Branding

Currently the Helvetas-IDE drip irrigation systems are being sold under the Indian KB brand within the Helvetas SEP Project, which is donor-funded and is working with a development assistance approach, i.e. partners are supported on non-market terms for not-for profit activities.
Although no farmer interviewed indicated such, there may be a risk that especially wealthier, innovative farmers will not buy the product because they think it is not meant for them, but will perceive the product specifically as developed "for the poor".
On that account it is suggested to build a strong drip irrigation brand in Kyrgyzstan which is positioned in the market as independent of the SEP-Project, although links to the project will certainly remain strong.
The DIS sold under this new brand will look modern and inventive and at the same time will be affordable, of high quality and provide a high return on investment. This branding should be done in cooperation with a future wholesaler or even preferably by a wholesaler himself.
It is also suggested that in the mid term a possible future brand should include various drip systems of various quality and prices. A farmer then himself is able to choose what kind of product fits him most.

4.1.4. Product: Supporting Services (Technical Support)

In the season spring/summer 2011 SEP project supports the consultancy and installation services the retailers are providing. However if the market for drip wants to become sustainable in the mid-long term the farmers will have to pay for these services themselves. Retailers will therefore either need to build up know-how, which they can then sell to the farmers or contract partnerships with consultancy agencies that can provide such knowledge (e.g. ZOKI, different RASs, etc.).
Most important for this is that as quickly as possible more drip irrigation specialists are being qualified in Kyrgyzstan.
Helvetas-IDE DIS is currently developing an easy to read installation and maintenance manual in which all the necessary information is included and in case of need necessary contact information is provided.
Moreover a manual for retailers should be developed by ZOKI staff in which all the necessary information regarding supporting

services is included as well.

4.1.5. Product Adaptation to Kyrgyz Conditions

The product has to be adapted to the context of Kyrgyzstan.

This has already been done in parts for example as to the quality of the laterals. In India 125micron laterals are best sold which however do not seem to fit Kyrgyz farmers. They prefer to have a higher quality lateral (e.g. 250micron), but therefore also will need to pay a higher price.

Also pre punched laterals do not seem to be necessary, but farmers prefer to choose and punch the holes themselves according to their plot needs.

The experiences in Kyrgyzstan with DIS are still few and therefore product adaptation will never be completed, but shall be regarded as a constantly running process.

In this regard it is important to mention that sourcing material in China should be imperatively followed up already in 2011. The geographical conditions especially in Urumqi are similar to the ones found in the South of Kyrgyzstan and there is much know-how and material around as to artificial irrigation material in China. Moreover it turns out that Chinese made systems are not only cheaper, but the drip technology also more sophisticated and of higher quality (see Appendix VII: Urumqi Mission Report).

4.1.6. Product: Diversification

The needs and requirements of Kyrgyz farmers are very diverse, i.e. they grow different crops and have different sizes and forms of arable plots.

It is therefore suggested that not only various entire systems are imported and available ex stock from the wholesaler and some retailers, but that these systems - if necessary - can also be adapted to the requirements of a particular farmer and his specific plot.

A more promising strategy than offering entire systems might be to make the systems available in individual parts. DIS should fit any plot size and shape.

Therefore not only entire systems should be sold, but every individual part of a system must be available. Farmers in this way will be able to put a system together themselves. Some farmers expressed for example that they only need the laterals and the micro-tubes and can find the remaining components of a DIS (e.g. valves, filters, etc.) on local markets. Moreover the available drip material should also be constantly enlarged, i.e. not only Indian low-cost, but also Chinese low-cost and medium cost systems and parts should be available in the mid term for interested farmers.

In short for reasons of convenience and customer service, all parts of a complete system and various complete systems themselves should be separately available to purchase.

4.1.7. Price: Low-cost versus Quality

The Helvetas-IDE DIS are low-cost systems and should be affordable for all Kyrgyz farmers interested in trying out the technology.

Bigger, better-off and innovative farmers that are marketing their products have enough money to pay for the actual prices of the Indian DIS and it will be profitable for them if they use the systems in one of the mentioned purposes. These farmers are even able to pay for higher quality longer lasting drip systems, e.g. from China, which should therefore become available for them as well.

Low-cost raises the question if the product will be associated with low quality, which has to be prevented.

Avoiding a low quality impression of its products Helvetas-IDE does best by building up a strong brand which is identified with affordability, simplicity and yet quality.

As already seen this includes an in depth testing of the actual Indian systems and an honest and transparent disclosure of their weaknesses, which then in a second step have to be resolved. Another option is to start importing also higher quality, longer lasting material from China or India. In the mid-long term farmers themselves should be able to choose what kind of system and quality fits them most.

4.1.8. Price: Competition

If the market for drip irrigation in general will pick up, obviously price leadership for the Indian DIS will hardly be possible since most likely cheaper Chinese systems or even copy cats will become available in the mid term. This is most welcome since it would prove that private money starts being invested in the creation of the market for drip in Kyrgyzstan. For Helvetas-IDE partners this can be anticipated by sourcing some of the parts of a DIS in China and/or by starting to produce locally in

Kyrgyzstan.

Regarding more expensive, longer life span drip irrigation systems, it would only be welcome that Ukrainian, Israeli or European drip system producers start selling their products on the Kyrgyz market as well. By doing this they would help developing the market.

The Helvetas-IDE business approach for developing supply chains considers competition as a driver to make a good quality product available at affordable prices. The market (farmers) will finally decide which product at which price and which quality is most suitable for them.

4.1.9. Price: Discount Policies

Another price related question is whether or not there should be a discount policy. A discount policy can certainly be very effective, but will be somehow difficult to be put into practice.

Discount policies are possible for farmers as well as for those selling the system.

- Discount policy for farmers: An efficient way to improve sales is to create incentives by encouraging farmers to tell others about the drip system. If those other farmers buy a system within a certain deadline, the first farmers are then entitled to a discount of say 10 %.
- Discount policy for retailers: If retailers buy a certain quantity of drip systems, there might be a discount too. However, it is important that the wholesaler has a strict discount policy regarding retailers (for instance 15 % off if they buy 25 systems, 20 % off if they buy 50 systems).

Furthermore in the Kyrgyz context bargaining and giving discounts to customers is part of the business culture. A retailer will therefore in many cases offer a discount to his clients, but this discount is already part of the pricing strategy (official offer 10% higher as actual sales price)

4.1.10. Price: Microfinance

Micro-finance is a possible way to support farmers that are willing to buy a system, but for whom the actual prices are just too high.

However it has to be considered that presently in Kyrgyzstan interest rates for agricultural micro-credit loans at market terms are more than 30% per year, which makes them a costly and somehow risky issue.

Therefore high priority has to be given to keeping margins and prices low and in addition if possible to reduce importation and production prices.

However if a farmer wants to buy a DIS on credit, he should not only be free to do so, but most likely need to be supported regarding red tape involved and the necessary procedure to follow.

Some organizations and agricultural service providers are for instance capable of offering microloans at lower interest rates due to donor support, e.g. Mehr Shavkat is offering micro credits for vegetable farmers at 18%.

It has to be followed up with which micro loan institutions cooperation regarding low-cost DIS is possible and desired and possible payback schemes for farmers for different sizes of drip systems and for different crops should be developed. Wholesalers and retailers should then be linked with these micro credit institutions.

The micro finance aspect needs thus necessarily further attention in the near future (see Appendix III: Market Concept Schedule).

4.1.11. Price: Diversification of Prices

The goal for the future is not only to sell whole „system packets“ with all necessary parts included, but prices should also be given for each individual part of a system, i.e. each piece of filter, of valve or micro tube, as well as each meter of lateral or main tube should have a price.

Only in this way individual and flexible solutions for various plot shapes and cropping systems can be offered and the corresponding prices calculated. Some farmers may even opt for only buying laterals and micro-tubes and build the remaining necessities themselves.

In order to guarantee this in cooperation with a future wholesaler a detailed product catalogue has to be developed, published and constantly updated and if possible enlarged.

4.1.12. Price: Reduction of Prices

The present Helvetas-IDE systems have been imported from India, which is a quite long and expensive procedure raising considerably the final price. International transportation costs and Kyrgyz custom costs account for around 18% of the final

purchasing price, although having been subsidized by 50% by the Helvetas-IDE project. (See Appendix IV: Price calculation KB Drip Irrigation Systems)
Some interview partners indicated that in order that all farmers - also the poorest ones - can afford the SEP-IDE DIS the purchasing price for a 200 square meter system should not exceed Kyrgyz Som 2'000 to 2'500 (~US$ 40-50). However this price is actually at around Kyrgyz Som 3'500.
It is therefore suggested that local production or Chinese sourcing of at least some parts of a DIS is considered as soon as possible in order to reduce the purchase prices for farmers (see Chapter 5: Manufacturing and Production in Kyrgyzstan and Appendix VII: Urumqi Mission Report)

4.1.13. Price: Additional Costs

The installation of a DIS always requires further investments. For instance the costs of the water reservoir should not be neglected by a farmer and the latter expressed the need to fence a plot to protect a DIS from animals or theft.
Reservoirs can be easily found and purchased on local markets, but they increase considerably the final price, especially if they need to be of bigger size. Therefore SEP-IDE should study the market and consider the opportunities of production for low-cost quality water storage means as well.
Naturally, the additional costs for a water reservoir are not particular for low-cost drip but are part of the overall technology and are one reason why drip is much more expensive than for example furrow irrigation. This is why the costs of the systems can not be assessed in absolute figures but are related to the costs of water. In Kyrgyzstan where water is in most areas flowing in open channels and considered to be for free, investments in water storage are not very common; in contrast to Tajikistan for example where many farmers already have water storage facilities.
Furthermore even once a system is installed continuous expenses will be necessary for example for labor to keep the system under constant surveillance and do the fine tuning of the irrigation process.

4.1.14. Placement: Sales Area

Regarding placement please also refer to Chapter 3: Creation of a Sustainable Supply Chain.
The SEP Project area is in the South of the country, this is why the market testing started in this area. However there is potential for selling DIS in the whole of Kyrgyzstan, e.g. in Issyk Kul, Talas and Chui Oblast where intensive vegetable and fruit production takes places. Furthermore potential for drip irrigation also exists generally in mountainous areas where water has to be lifted to irrigate fields, e.g. in Naryn Oblast, but also in mountainous areas of Jalalabad and Osh oblast (up to now not covered by the retailers)
The sales area should be mainly increased by the acquiring of new retail partners in places where drip technology may be beneficial.

4.1.15. Placement: Availability of DIS and Spare Parts

Presently all the imported DIS are stored in a small warehouse in the suburbs of Osh. Due to the run down infrastructure in Kyrgyzstan, especially roads, it is time and money consuming to ship DIS from this warehouse once an order is received or to replace parts of a system if something breaks.
The availability of DIS and spare parts can only be improved by having a decentralized warehouse system, with storage capabilities in the centre of each oblast and by providing at least bigger retailers with some systems up front, which they are able to sell ex stock. It is therefore conceivable that retailers are provided with DIS without prepayment or with only partial prepayments and will need to pay the residual amount only once they have sold the systems or after a certain time has elapsed.
Moreover once a commercial company has taken over the responsibility for the wholesale it is assumed that their (already proven) warehouse system can be used for DIS.
Due to the actual ethnic-cultural conflicts in Kyrgyzstan it has to be ensured that the supply chain reaches both Kyrgyz and Uzbek communities and farmers, viz. Uzbek and Kyrgyz retailers have to be established.
This needs to be defined as a strategic goal of the Helvetas-IDE project.

4.1.16. Promotion: Lack of Knowledge about Drip Irrigation

When suggesting a promo strategy, it has to be kept in mind that the Helvetas-IDE budget is limited and cannot support all activities and materials that might be needed. The focus has thus to be on few promo activities, which this and next year have the best effect and should therefore be supported.

However if the technology proves successful under Kyrgyz conditions and both at wholesale and retail level financial benefits are made, low-cost drip technology will at least in the mid term also start being spread with private sector money.
The biggest issue is the lacking knowledge about drip technology of people in general and of retailers in particular. Retailers do not know yet how to draw schemes for different field conditions, they lack knowledge about different systems (e.g. Indian or Chinese, different technologies and qualities), flow rates, necessary reservoir sizes, installation and maintenance issues on difficult plot conditions (e.g. on steep slopes) and for some retail partners experiences regarding marketing and sales activities are insufficient.
Therefore retailing partners are presently being supported with technical as well as promotional information and materials by the Helvetas-IDE project.
What may still need to be developed is a detailed manual for retailers which includes all necessary information regarding the promotion, sales, installation, maintenance and repair of DIS of different technologies, forms and sizes in various conditions. In case of ambiguities reliable contact information has to be provided in this manual as well. Also the present product catalogue should be included which gives an overview over all the available parts and spare parts, product numbers and information as well as wholesaling prices for each individual price.
Unfamiliarity with the technology also implies unfamiliarity with its advantages.
Therefore it is important that still in 2011 various DIS are being installed in order to test the technology under local conditions for different sizes and crops, gain experiences as to its advantages and limitations and at the same time spread knowledge about the technology.
First movers, i.e. innovative farmers are therefore presently closely followed as to their success compared to plots where drip irrigation is not used. The goal is experimental comparative studies in order to show the effects of the use of drip irrigation and gain profitability indicators.

4.1.17. Promotion: Promotional Activities

In order for customers to identify with the specific DIS IDE and Helvetas are providing, the promotional activities of all partners (wholesalers and retailers) should be coordinated and come along in the same look (brand creation). Coordination has to be accomplished on wholesale level and will certainly be facilitated once a strong low-cost drip brand has been created in close cooperation with a future wholesaler.
Possible promotional activities for low-cost DIS can be grouped into two groups:

- Static promotion: leaflet, wall painting, dealer signboards, caps, t-shirts, fixed demonstrations, banners, posters, radio and TV messages
- Dynamic promotion: personal selling, opinion leaders, mobile demonstrations, farmer meetings, video van shows, short campaigns, farmer field days.
  (Heierli, Katz (2007), 39)

In Bangladesh the assessment of different promotional activities clearly showed that dynamic promotion means are more effective than static ones, especially at the beginning of a market creation process. (Mehta (2004), 77ff)
Up to now within the SEP Project it has been decided that regarding static promotion one sort of leaflet, two sorts of posters, one sort of banner and fixed demonstration plots will be supported and regarding dynamic promotion SEP-partners will organize farmer field days on the demonstration plots.
Furthermore in spring/summer 2011 SEP-partners do get a lump sump of around US$ 200 for their own promotional materials and activities.
SEP-partners and other potential retailers need to first be able to gain information about drip technology themselves and get convinced of the advantages before they will be able to successfully sell them.
It is very important that the quality of the demonstration plots leaves nothing to be desired, i.e. broken and low quality parts are immediately replaced and the installation of a demo plot has to be supervised by a technical specialist (e.g. ZOKI staff). Otherwise SEP-IDE DIS run the risk of receiving bad publicity and getting a bad image due to quality deficiencies of the present Indian systems. Correcting such a bad image would take considerable time and money efforts and would constitute a general setback to the creation of a market for low-cost DIS.
Almost all the farmers in Kyrgyzstan have a TV (only 1-2% of farmers are without a TV), so for both publicity and promotion purposes this medium might be useful, i.e. TV-programs targeted at farmers presenting drip irrigation technology as well as specific advertising spots of the Helvetas-IDE DIS developed in close cooperation with a future wholesaler..
Radio advertising through commercial stations as well as loudspeaker advertisements on local markets and bazaars can also serve as a mass media marketing tool.

However marketing research shows that mass media advertising is the more effective the more a market is already developed, i.e. innovators and the early adopters are already using the technology. (See Mehta (2004), 77ff)

4.1.18. Promotion: Promotional Materials

In order for customers to identify with the specific DIS IDE and Helvetas is providing, the promotional materials of all partners (wholesalers and retailers) should be coordinated and come along in the same look (brand creation). Therefore some materials about Helvetas-IDE DIS have to be provided to the retailers, developed in close cooperation with a future wholesaler.

Currently some SEP-partners are using different self-made posters, flyers and read-outs and apply their own marketing techniques (e.g. articles in newspapers and magazines), which is most welcome. However since knowledge about drip technology is still limited, these materials are sometimes of weak informational substance and only mediocre design and styling.

It is therefore suggested that of course all institutions involved as stakeholders in the supply chain should retain the freedom to use their own promotional materials, but should be supported.

Furthermore in terms of sustainability concerns the elaboration of promotional materials must be conducted in close cooperation with a future wholesaler.

Promotional material should be composed in Kyrgyz, Russian as well as Uzbek, since in the South of Kyrgyzstan also many Uzbeks are involved in agriculture.

Furthermore the leaflet should present information as simple as possible especially regarding the sizes and schemes necessary for different crops. DIS can be installed on any plot size and form up to one hectare.

As soon as data from Kyrgyzstan is available the leaflet should include simple and reliable information about water saving figures and harvest increases when using DIS.

If there are price indications they should preferably be in Kyrgyz Som, since indicating prices in US$ adds incertitude to the farmer. However for bigger, more expensive systems (e.g. 1 ha) prices may be indicated in US$ in order to mitigate currency devaluation risks of KGS.

4.1.19. Promotion: People and Institutions trusted by Farmers

In order to scale up the spread of drip irrigation technology and the knowledge about it, various partnerships and the cooperation with various partners is necessary.

Farmers may be reached via different people and institutions in order to get the message about reliable irrigation across.

- SEP partners/NGOs and agricultural extension services will play a crucial role in organizing demonstrational plots, field days and trainings where low-cost DIS are presented. Since these organizations are well integrated into the local context and farmers know them, their advice is being trusted. They can identify potentially innovative and risk taking farmers.

  Other NGOs up to now not included into the supply chain should be informed about low DIS and if possible involved into the spread of the technology all over Kyrgyzstan, especially by identifying regions where water is scarce and by identifying potentially innovative and risk taking farmers.
- Water User Associations (WUA): Most farmers in Kyrgyzstan are members of a WUA. WUAs are responsible to distribute water to the farmers according to cultivated crops, plot size and on farmer upfront request. There are more than 400 WUAs presently in Kyrgyzstan. WUAs should be informed about the existence and advantages of DIS and preferably should spread this knowledge amongst their member farmers. Currently in round 4 of SEP project, there are 8 WUAs participating.
- Cooperatives can tell their member-farmers about DIS and advice to use it for farmers with irrigation problems. They can identify regions where water is scarce and potentially innovative and risk taking farmers.
- Commercial shops should as soon as possible out of their own commercial interest promote DIS to farmers for whom the technology might be beneficial. Accordingly they have to be supported in their efforts by providing them with materials - such as leaflets, posters and banners - and possibly also financial support in order to install a demo plot. Regarding sustainability concerns financial support for installation, transportation and after sales services should as soon as possible be restricted.

4.1.20. Promotion: Complementary Goods

Drip irrigation and greenhouses are complementary goods. Farmers already using or planning to purchase a greenhouse should therefore be informed about drip irrigation technology. In this regard it has to be identified through which channels farmers

presently buy their greenhouses in order to use these same channels to sell drip irrigation technology. The agricultural service providers who are partners of the SEP project are one possible channel, since most of the partners are supporting farmers to install greenhouses.

4.2. Expansion to other Central Asian Countries

There are possibilities to expand Helvetas-IDE DIS also to other countries in Central Asia, with Tajikistan presenting in the near-term the biggest potential.
The potential for low-cost DIS in Uzbekistan, Kazakhstan and Turkmenistan will still have to be followed up.
Expansion to other Central Asian countries may also allow to quicker generating high enough sales turnovers in order to economically justify Kyrgyz or Chinese production of parts or even entire low-cost DIS.

4.2.1. Tajikistan

In Tajikistan the potential is high because the technology is not only already known, but some possible partners already approached the Helvetas-IDE project in Kyrgyzstan and are willing to become retailers.
Actually in the Fergana valley some farmers are using Chinese or European systems, the latter need to be operated by pumps and therefore are more expensive. Furthermore SDC supports drip activities in Tajikistan12, but purely on a technical level and not market creation orientated.
SEP through its present wholesaler ZOKI is installing already in summer 2011 some demonstration plots near Khujand for vegetable cultivation, which will allow to test the Indian DIS under Tajik conditions.
Most likely the situation regarding promotion and the market creation plan is very similar to the situation in Kyrgyzstan, but should certainly be followed up as soon as a decision regarding expansion to Tajikistan is taken.
Regarding the supply chain lessons learnt in Kyrgyzstan could be adapted and therefore the process should be easier.

Customs Union of Belarus, Kazakhstan and Russia

Leaders of both Kyrgyzstan and Tajikistan voiced their interest in joining the customs union between Belarus, Kazakhstan and Russia, which is set to remove all custom borders between the three countries from 1st July 2011 onwards. Such a step would certainly facilitate the spread of DIS between Kyrgyzstan and Tajikistan.
However if Tajikistan will not join the customs union already by this year, clarifications regarding customs, transportation and storing of DIS in Tajikistan will have to be undertaken.

4.2.2. Uzbekistan

In Uzbekistan the situation as to the potential of low-cost DIS has to be followed up.
It has to be emphasized that NGOs are not as freely admitted and able to act as in Kyrgyzstan or Tajikistan and good contacts to the government seem necessary. However working via the SDC office in Tashkent or using a pure business approach may offer some opportunities to overcome this obstacle.
Furthermore SDC supports drip activities in Uzbekistan (WPI-PL), but purely on a technical level and not market creation orientated.
In Uzbekistan there are presently some imported high cost systems or (lower cost) home made drip systems in use.

4.3. Marketing Plan Schedule

It is important to have an adequate timing for the promotion of low-cost DIS. It has to be stressed however that the marketing strategy should be defined by the wholesaler and the retailers and only be supported where necessary by the Helvetas-IDE project.
In agriculture a marketing plan has to be defined according to the cultivation season and in Kyrgyzstan there are two planting and harvest seasons, one in spring and one in autumn. However inside greenhouses planting may take place year-round.
The dry season in the south of Kyrgyzstan lasts normally from the beginning of June until middle of October and the driest time of year is July, August and September.
Usually farmers decide on the irrigation technology at planting time and therefore intense marketing activities should start just

[12] In the frame of the regional Water Productivity Improvement at Plot Level Project, WPI-PL, 2009-2011

before and continue throughout the planting seasons (see table 9). Planting season may be used as synonym for selling season of DIS.

However since greenhouses may be purchased and installed year-round, marketing activities have to be constantly running at least to a certain degree.

Furthermore farmers mostly have cash money available at the end of an agricultural season, when they have sold their harvest. It is therefore in this period when many make main big purchases as for example a bigger DIS.

At the beginning of the market creation process, since drip technology is not widely known yet, marketing activities should also take place during the hot, dry summer. It is during this time when farmers are most aware of lack of irrigation water and may actively look for solutions.

Generally it has to be considered that the availability of irrigation water strongly varies on a yearly basis depending on (late) winter snowfalls, rainfalls in spring and the general weather situation. That's why in Kyrgyzstan there are many traditional sayings about possible rainfall patterns depending on lunar phases, animal behavior or the condition of a specific tree at a given time. Sales of DIS will therefore always vary depending on the particular aridity of the previous and the current year.

The next planting seasons will take time in autumn 2011 for orchards and in winter/early spring for vegetables. This next selling season will have to be timely prepared regarding promotional activities and materials.

After October there should be a period of controlling, evaluation and adaptation of the marketing strategy in order to plan for the next year. It is important for Helvetas-IDE project to revise its support for the marketing of the partners after every promotion cycle, depending on the progress and stage of the market creation process.

Table 9 shows and summarizes the suggested time of marketing activities according to the different planting and dry season(s).

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Dry Season												
Marketing												
Planting period for orchards												
Planting period for vegtables												
Planting period inside greenhouses												

Table 9: time of intense marketing

5. MANUFACTURING AND PRODUCTION IN KYRGYZSTAN

5.1. PRODUCTION PROCESS

Most of the components of a low-cost drip irrigation system can be manufactured through a simple plastics extrusion or injection molding process.

"Plastics extrusion is a high volume manufacturing process in which raw plastic granules are melted and formed into a continuous profile" and therefore amongst others produces items such as pipes and tubing. The granules are melt into a liquid which is forced through a die, forming a long 'tube like' shape. The shape of the die determines the shape of the tube. The extrusion is then cooled and forms a solid shape. The tube may be printed upon, and cut at equal intervals. The pieces may be rolled for storage or packed together.

(Wikipedia (2011))

Injection molding is a manufacturing process for producing various plastic parts. Material is fed into a heated barrel, mixed, and forced into a mould cavity where it cools and hardens to the configuration of the mould cavity. Moulds are made from metal, usually either steel or aluminum, and precision-machined to form the features of the desired part. Injection molding can be used for manufacturing a variety of parts, from the smallest component to entire body panels of cars. (Wikipedia (2011))

In order to see what parts are necessary for a typical low-cost DIS, through which production process they are made and which Kyrgyz companies are able to produce what, please refer to Appendix VII: Components of a drip irrigation system.

5.2. Raw Materials

The components for a low-cost micro irrigation system are manufactured from plastic materials such as linear low density polyethylene (LLDPE), low density polyethylene (LDPE), high density polyethylene (HDPE), polypropylene (PP) and polyvinylchloride (PVC).

Especially in Europe there has been an intensive discussion about the ecological risks related with the use of PVC. Nowadays it is somehow accepted; that PVC is not a very fine solution, but at least it is one and mostly it is the cheapest one. However if there are better alternatives available - such as polyethylene - one should prefer those.

Besides the aspect of waste disposal, it has also to be born in mind that with polyethylene a longer life span can be expected than with PVC since there are no problems of loss of plasticizers and since polyethylene is not attacked by microorganisms. (Vogt (2011))

In Kyrgyzstan all different plastic are available with the raw materials either coming from Russia, Uzbekistan, China, Korea, Turkey or Iran. Iranian raw materials are supposed to have the best price-quality ratio.

In Bishkek the sale of plastic raw materials is a monopoly, where a Turkish wholesaler due to economies of scale is controlling the whole market. Raw material is sold in standardized 25kg bags.

Actual wholesaling prices as of spring 2011 are summarized in table 10. The prices vary as to the quality and origin of the raw materials, the availability and the purchasing volume.

Type	**US$/tonne**
Polypropylene (PP)	$ 2'000 – 2'000
Polyvinylchloride (PVC)	$ 1'000 - 1'900
High density polyethylene (HDPE)	$ 1'250 – 2'200
Low density polyethylene (LDPE)	$ 1'000 - 2'300
Linear low density polyethylene (LLDPE)	$ 2'000 – 2'300
Second hand polyethylene	$ 500

Table 10: wholesaling prices for plastic raw materials in Kyrgyzstan (spring 2011)

The quality of the raw materials and the exact mixture of various inputs into the production process are critical also regarding the resistance of the final product to sun radiation.

Some plastic producers in order to save costs are using second hand plastics as raw materials. For instance Alim is using second-hand polypropylene food packing and sealing parts for molding and extrusion and both Jalalabad based tube producers are using second hand polyethylene packing as raw material for their extrusion machinery.

5.3. Moulds and Dies

For each part of a drip irrigation system being produced by injection molding a specific mould has to be manufactured.

Moulds can either be produced locally in Kyrgyzstan, in China or imported from India. Exact measures and production drawings for moulds for various DIS parts are available via IDE.

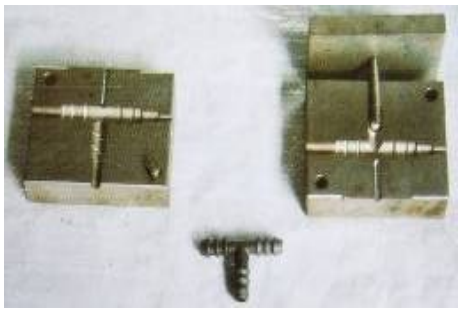
Kyrgyz made moulds will - depending on the size of a specific part - cost from $800 (retainers) to $ 5'000 (filters) per piece and will take around three months to be delivered.

Interview partners indicated that Chinese produced moulds are cheaper and quicker available (normally within one month), but that the quality is more difficult to control and guarantee. Nevertheless if a reliable Chinese mould producer can be identified, this would be the best (cheapest) option.

Up to now no follow up has been conducted as to sourcing moulds in India.

It has to be emphasized that it is advantageous to be owner of the moulds. In this way plastic producers can be controlled as to the prices they are offering, since all other input costs are easily available (e.g. labor, electricity, taxes, etc.). And if cooperation does not work out, the moulds can be used at a different production site, since the fittings of a mould are internationally standardized.

Picture 1: Indian made single cavity mould for plastic valve



Picture 2: Indian made single cavity mould for 16mm equal tee

The same also applies for dies. Dies determine the shape and size of a pipe produced by extrusion in terms of diameter and wall thickness. Dies may be produced in Kyrgyzstan, China or India, but production possibilities, delivery times and costs still need to be followed up.

Extrusion manufacturers have normally different dies already available. However the availability of dies of the needed diameters and wall thicknesses will still have to be followed up as well.

Picture 3: Indian made dye and sizer unit for 4mm diameter pipes with 1mm wall thickness

5.4. Quality Control

Since the quality of the drip irrigation system is a critical and basic function determining customer satisfaction, in case of Kyrgyz or Chinese production, it is important to set the quality parameters already at the manufacturing level because at the farmer level it becomes difficult to differentiate between a good product and a bad product.

The quality of a drip irrigation system depends mainly on the inputs and the manufacturing process and therefore quality should be ascertained at the following levels:

- quality of the raw materials
- quality of the manufacturing process
- quality of the manufactured components

For manufacturers it is important to test samples and ensure quality. However small manufacturers do not have their own laboratory, so it may be necessary for them to send samples to outside laboratories for testing.
There should be standardized quality control mechanism installed that are valid and binding for all partners (e.g. a reliable warranty system, quality controls during production and during installation).
As already mentioned the quality of the raw materials is critical as to the resistance of the final product to sun radiation.

5.5. Kyrgyz Plastic Producers

Both extrusion and injection molding machinery of various kinds can be found in Kyrgyzstan.
For this report production possibilities in Osh, Jalalabad and Bishkek have been studied.
Unfortunately after the 2010 June events in Osh all plastic production plants have stopped working.
In Jalalabad two small extrusion plants and one bigger injection molding plant have been identified.

- Bahram, small plastic extrusion plant
  This plant has presently two extrusion machineries, but only one is working. The owner is an experienced Uzbek plastic engineer. They are exclusively producing polyethylene tubes of various sizes using second hand plastics, LDPE or HDPE.
  In case this small plant would start producing tubes for drip irrigation systems, it would need support as to what exact mixture of raw materials to use and support for improving their machinery.
  Bahram can give a one year guarantee on its products.
- Saypitdin, small plastic extrusion plant
  This plant has presently one extrusion machinery working and is producing exclusively tubes of various sizes using second hand plastics, LDPE and HDPE. The owner is an Uzbek tradesman who owns his own shop in Jalalabad selling various tubes, sanitation as well as irrigation parts.
  The plant staff has been taught by Bahram how to produce plastic tubes and would need to be supported regarding raw materials and infrastructure in case they would start producing low-cost drip irrigation tubes.
  Saypitdin can give a one year guarantee on its products.
  The owner's son is actually living in Urumqi, China, speaks the language and sources there material for his father's shop. They provide therefore a good link to China in case of possible Chinese sourcing of drip irrigation parts.
- Salahidin, injection molding plant
  This plant has different injection molding machineries and is based inside an old soviet industrial compound.
  However doing preliminary clarifications, the chief engineer told that the plant is actually used to capacity and they are not able to produce components for drip irrigation parts. Nevertheless if need arises, this contact should not be ignored.

In Bishkek one mould producer, one injection molding and extrusion plant and two extrusion plants have been identified. Moreover CELEBI group plans to open a PVC production plant in Bishkek already by the end of 2011.

- Turbion, extrusion machinery production and injection molding forms
  Turbion based on German know-how is producing extrusion machinery of various sizes and among other things is also specialized in the making of molding forms. Turbion is a medium sized industrial company with actually around 100 employees.
  The director is a Russian engineer with a good network regarding plastic manufacturing in Kyrgyzstan. He is also having close contacts to China and his network and knowledge should not be neglected if Chinese production and sourcing of drip irrigation parts is considered, especially regarding the purchase of moulds.
- Alim, Plastic injection molding and extrusion plant
  This plant has both injection molding and extrusion machineries installed and is of middle size with around 25 employees. The director is a Turk with a professional and transparent approach and a great network in Kyrgyzstan as well as in China regarding not only plastic, but also mould production. This plant is without external support ready to produce different components of a drip irrigation system. It has to be emphasized that depending on production capacities in Kyrgyzstan, Alim does also produce in China via Chinese partners.
  Alim can give a one year guarantee on its products.
- Bülent, Extrusion plant
  This is a small extrusion plant outside of Bishkek producing exclusively pipes of various shapes using mostly Iranian raw materials. The plant has four extrusion machineries of different sizes actually running and around 10 employees.

The owners are Turkish and already since eight years in the business. With some support regarding raw materials and maybe also infrastructure, Bülent can produce different tubes for drip irrigation systems.
According to Mehmet, the director's assistant, regarding guarantee the exact conditions have to be negotiated.

- Suat, Extrusion plant
  Suat is a medium sized Turkish extrusion in the center of Bishkek producing exclusively pipes of various shapes and having a partnership with a Turkish irrigation equipment manufacturer (ASBIR A.S.). It has presently three extrusion machinery running and imports all other components for their expensive long lifespan drip irrigation systems from Turkey. Actually however no Turkish drip irrigation systems are available, prices are unknown and no marketing activities are being conducted.
  Suat would be able with some technical support to produce tubes for the Helvetas-IDE drip irrigation system.
  Suat gives a one year guarantee on its products.
- CELEBI group, PVC production planned, importation of Turkish and Chinese PVC tubes
  CELEBI group is actually a bigger store in the centre of Bishkek selling various sanitation and drainage equipment imported from either Turkey or China. Many of the products are made of PVC and come in a standardized shape that needed adaptation in order to be used for a Helvetas-IDE drip irrigation system.
  CELEBI group plans to open a PVC production plant in Bishkek by the end of 2011. If this is implemented, CELEBI group would become the only producer of PVC tubes and PVC sanitation equipment in Kyrgyzstan and should therefore be followed up. Moreover the Chinese network of CELEBI group provides important contacts in case of Chinese sourcing or production.

5.6. Summary about Kyrgyz Plastic Producers

Manufacturer	Machinery	Raw materials	Quality guarantee/ warranty	Production of what parts of DIS	Remarks
Bahram, Jalalabad	Extrusion	Second hand plastics, LDPE, HDPE	-Quality guarantee at all three levels not controlled (raw material, manufacturing, manufactured) -One year warranty	Main and sub main tubes	-Would likely need financial support for the improvement of machinery and raw materials
Saypitdin, Jalalabad	Extrusion	Second hand plastics, LDPE, HDPE	-Quality guarantee at all three levels not controlled (raw material, manufacturing, manufactured) -One year warranty	Main and sub main tubes	-Taught by Bahram -Has connections to Urumqi
Salahadin, Jalalabad	Injection molding	PP	-Quality guarantee at all three levels not controlled (raw material, manufacturing, manufactured) -One year warranty	Take off valves, joiners	-presently used to capacity
Turbion, Bishkek	Extrusion machinery production Moulds production	Various for various production processes	-Quality guarantee at all three levels (raw material, manufacturing and manufactured) -Various warranty schemes	Moulds for injection molding	-Contacts to China for mould production
Alim, Bishkek	Injection molding Extrusion	Second hand, PP, HDPE, LDPE, LLDPE	-Quality guarantee at all three levels (raw material, manufacturing and manufactured) -One year warranty	Main and sub main tubes, laterals, micro tubes, take-off valves, joiners	-Production partners also in China (plastics and moulds) -No technical support needed

Bülent, Bishkek	Extrusion	LDPE	-Quality guarantee at all three levels (raw material, manufacturing and manufactured) -Warranty issues need to be negotiated	Main and sub main tubes, laterals, micro tubes	-Need some support as to necessary raw materials
Suat, Bishkek	Extrusion	LDPE, PP, HDPE	-Quality guarantee at manufacturing level not on raw material and manufactured level -One year warranty	Main and sub main tubes	-Partnership with Turkish drip producer (ASBIR A.S.) -Need some support as to necessary raw materials
CELEBI group, Bishkek	(Future) PVC production	PVC	-Not known	Various PVC parts (tee connecters, tubes, valves, etc.)	-Presently importing Turkish and Chinese PVC tubes, mainly for sanitation and drainage purposes

Table 11: Summary about Kyrgyz Plastic Producers

5.7. Remarks regarding Chinese Sourcing or Production

As already mentioned above Alim is having partnerships with Chinese plastic producers and is therefore capable of organizing both Kyrgyz and Chinese Production.

Moreover there are many Kyrgyz-Chinese tradesmen with an excellent network in both Kyrgyzstan and China trading all kinds of goods, also specifically agro-inputs and plastic products (e.g. CELEBI group).

These two options provide a useful initial point regarding Chinese sourcing or production of Helvetas-IDE DIS.

Furthermore a market research mission as to the availability of Chinese drip systems and production possibilities in Urumqi, China has been undertaken in the first half of June 2011. The results are summarized in Appendix VII: Urumqi Mission Report.

5.8. Price Comparison Indian, Kyrgyz or Chinese Sourcing

Price Comparison Indian, Kyrgyz or Chinese Production		
	Difference of price in % in case of Kyrgyz Production	**Difference of price in % in case of Chinese Production**
Lay Flat Pipe 63 mm, 900 micron - 1kg - 6m	**-28%**	**-64%**
Drip Laterals 250 micron Plain - 1kg - 80m (± 5m)	**-18%**	**-59%**
Micro Tube cut into 20cm pieces - per piece	**-30%**	**-65%**
Take off valve 16mm - per piece	**-79%**	**not reviewed**
Joiners 16mm - per piece	**-56%**	**not reviewed**

Table 12: Price comparison Indian, Kyrgyz or Chinese production

As part of this report price comparisons have been made as to the cheapest option where to source different parts of a low-cost DIS with information gathered in Kyrgyzstan. For further information about available drip technology in China and production

possibilities in Urumqi, please refer to Appendix VII: Urumqi Mission Report.

Table 12 summarizes the results for the parts of a DIS with the highest share of the total costs (for more details refer to Appendix V: Price Comparison Indian, Kyrgyz or Chinese Production).

Depending on the location of production cost reductions up to 79% can be realized.

However costs necessary to be able to start Kyrgyz or Chinese production at all are not included in these figures and should not be ignored, i.e. transaction costs (especially negotiation costs and moral hazard), costs for the moulds and in some cases costs for technical support.

Also production capabilities and partnerships for Kyrgyz or Chinese made DIS will take time to build up.

5.9. Recommendations

The production of low-cost DIS is possible in Kyrgyzstan as well as in neighbouring China. Both injection moulding and extrusion machinery can be found in Jalalabad and Bishkek and the necessary raw materials are available.

Local or Chinese production of a low-cost DIS would considerably reduce the final price (up to 50%) and should therefore be undertaken – at least partially - as soon as demand for low-cost drip irrigation systems in Kyrgyzstan starts picking up.

Necessary moulds for injection moulding can be produced either in Kyrgyzstan or China and as to price control it's recommended for a DIS wholesaler to be owner of the moulds. The sourcing and importing of moulds should be followed up.

The availability of necessary dies for extruding pipes of various diameters and wall thickness needs to be followed up, as well as prices.

It has to be kept in mind that building up local or Chinese production will take time and demand additional initial investments and that the quality of locally or Chinese produced DIS-parts has to be guaranteed.

Table 13 gives an overview of the main parts of a low-cost DIS and prioritizes which one can and should be produces in Kyrgyzstan or in China as to the cost share, the possibility, the overall importance and the needed equipment.

Name of part	**Cost share of system**	**Saving potential (high, medium, low)**	**Possibility to produce in Kyrgyzstan or China (easy, medium difficult, impossible)**	**Importance to produce in Kyrgyzstan or China (high, medium, low)**	**Needed equipment (injection moulding and mould(s), extrusion and dye(s))**
Main pipe	20-55%	High	Kyrgyzstan : easy China : easy	High	Extrusion and dye
Laterals	12-23%	Medium	Kyrgyzstan : medium China : unknown	High	Extrusion and dye
Take off valves	2-12%	Low	Kyrgyzstan : easy	Medium	Injection moulding and moulds
Micro tubes	0.5-11%	Low	Kyrgyzstan : medium	Medium	Extrusion and dye
Strainer filers	3-13%	Medium	Kyrgyzstan : difficult/impossible China : unknown	Medium	Injection moulding, various moulds
Control/ball valves	5%	Low	Kyrgyzstan : Difficult/impossible China : unknown	Low	Sophisticated injection moulding process, various moulds
Rubber grommets	0.5-3%	Low	Kyrgyzstan: difficult/impossible China: unknown	Low	Unknown
Various other parts	<3%	Low	Kyrgyzstan: PP: easy; PVC: impossible China: unknown	Low	Injection moulding and moulds, other?

Table 13: Overview about main parts of a low coat DIS and which parts to source in Kyrgyzstan or China

In case of local or Chinese production it is suggested to consider this as a continuing process. Not all the parts can at once be produced locally or in China.

Moreover as the market research in Urumqi has shown, all necessary parts for a low-cost DIS are presently available in China and thus transportation costs and conditions as well as quality issues become the most decisive factors regarding from where to import (China or India) and where to produce (Kyrgyzstan or China).

Focus for Kyrgyz production must lie on the parts that are expensive to import into the country (e.g. non-collapsible tubes) and the sourcing of the remaining necessary parts should be decided as to quality and price concerns.

It has to be stressed however, that procuring parts from various sources in different countries will increase the risk that some parts will not fit each other and should therefore be closely watched.

Kyrgyz and Chinese production in the short term - as long as the market potential in Kyrgyzstan is not clear yet – should only be undertaken for parts that do not require high initial investments, i.e. that do not require the fabrication of moulds for injection moulding and at the same time offer the highest saving potential.

It is up to now unknown if the market demand even in the mid-long term will be high enough to justify economically to entirely produce low-cost DIS in Kyrgyzstan.

For more information as to available materials and prices in China and how to continue in the short term regarding procuring and production issues, please refer to Appendix VII: Urumqi Mission Report.

6. Market Concept Schedule

Table 14 illustrates the overall project schedule exemplified by the three challenging factors, promotion, supply chain creation and local production (for more details refer to Appendix III: Market Concept Schedule).

It has to be stressed however that the current SEP-project up to now is only planned until the end of 2012, after that new terms of reference need to be negotiated and that funds in general for the Helvetas-IDE project are and will be limited.

<table>
<tr><th>Year</th><th>Quarter</th><th>Promotion</th><th>Supply Chain Creation</th><th>Local/ Chinese Production/Procuring</th><th>Evaluation/ Controlling</th></tr>
<tr><td rowspan="3">2011</td><td>Q2</td><td rowspan="2">campaign</td><td></td><td></td><td></td></tr>
<tr><td>Q3</td><td></td><td></td><td></td></tr>
<tr><td>Q4</td><td rowspan="2">Preparation of 2012 campaign/support</td><td rowspan="2">Agreements with wholesaler and various retailers for 2012</td><td rowspan="8">Agreements with various producers in Kyrgyzstan/China</td><td>Progress analysis</td></tr>
<tr><td rowspan="3">2012</td><td>Q1</td><td></td></tr>
<tr><td>Q2</td><td rowspan="2">campaign</td><td></td><td></td></tr>
<tr><td>Q3</td><td></td><td></td></tr>
<tr><td>Q4</td><td rowspan="2">Preparation of 2013 campaign/support</td><td rowspan="2">Agreements with wholesaler and various retailers for 2013</td><td>Progress analysis</td></tr>
<tr><td rowspan="3">2013</td><td>Q1</td><td></td></tr>
<tr><td>Q2</td><td rowspan="2">Campaign</td><td></td><td></td></tr>
<tr><td>Q3</td><td></td><td></td></tr>
<tr><td>Q4</td><td></td><td></td><td>Progress analysis</td></tr>
</table>

Table 14: Marketing plan schedule regarding promotion, supply chain creation and local/Chinese production for low-cost DIS

Since the promotion campaign and sales season in 2011 is currently running, achievements can already be evaluated by the end of the 3rd quarter 2011.
In 2012 Helvetas-IDE should be prepared to start an intensive marketing campaign backed by an efficient supply chain and well prepared and designed promotional materials and activities.
In the course of 2011 and 2012 it is of utmost importance to gather as much experience and know-how regarding the installation, maintenance and use of low-cost DIS in Kyrgyzstan and spread this knowledge to as many people and institutions as possible all over the country. Therefore a detailed manual for retailers and other interested people should be developed by ZOKI staff.
In the years to come after 2012 Helvetas-IDE will be able to constantly reduce its involvement into the building up of the supply-chain and of local and/or Chinese production/procuring and may focus its efforts to various promotional activities.
It is suggested however that the Helvetas-IDE project will focus on a purely facilitating role, i.e. as much as possible of the promotion should be undertaken and paid by the various stakeholders of the supply chain out of their own financial interests.
Helvetas-SEP project in this regard should also not focus on promoting exclusively a specific drip irrigation brand, but on promoting drip irrigation in general. The goal for the long term must be a vivid competitive market environment where various drip systems are available both low and high cost, Indian and Chinese and a farmer himself may chose which system fits his needs best.

Regarding the expansion of drip technology into other Central Asian countries, in summer 2011 Helvetas-IDE with the support of Kyrgyz technicians (ZOKI staff) installed demonstration plots in the Tajik part of the Fergana Valley in cooperation with identified partners willing and motivated to promote and sell low-cost DIS in Tajikistan. These test sites should be closely followed and these first tests prove successful, already by the end of the 3rd quarter 2011 steps should be taken regarding the creation of a supply chain and the preparation of promotional materials and activities in Tajikistan for the season 2012.
Regarding the expansion into Uzbekistan in the 3rd and 4th quarter of 2011, first contacts have to be established regarding tests and the installation of demonstration plots for the season 2012.

In Kyrgyzstan currently various supply chain channels are being tested and accordingly their achievements can be evaluated by the end of the 3rd quarter 2011 as well.
Also by the end of the 3rd quarter 2011 Helvetas-IDE should work towards agreements with a new wholesaler and determine the retailers offering the highest sales potential in the near future with reference to the results of 2011.
However in case that the demand for low-cost DIS will already in summer 2011 exceed the present offer, the importation of a second container from India or China will have to be considered in close cooperation with a future wholesaler chosen after a transparent call for tender procedure.
Another option is to import continuously specific parts via China or India that risk to run out of stock, without ordering whole containers at once.

Regarding Kyrgyz or Chinese production/procuring Helvetas-IDE project can start working towards agreements as soon as the sales figures for 2011 are ready - by the end of the 3rd quarter 2011 - and the terms of reference for the future of the Helvetas-IDE drip irrigation project in Kyrgyzstan are clarified.
Local or Chinese production however are only economically justified once sales turnovers in Kyrgyzstan (and other Central Asian countries) are high enough to pay back the initial necessary investments within a reasonable time.
Nevertheless in order to initiate the price reduction process, tubes that do not require much initial investments should be produced locally or in China as soon as possible in close cooperation with a new wholesaler (see also chapter 5: Manufacturing and Production in Kyrgyzstan and Appendix VII: Urumqi Mission Report).
Sourcing drip material in China also opens the option not to import entire containers at once, but to import continuously specific parts as need arises, since delivery times are short compared to importation from India.

7. Conclusion

In my opinion all the steps presented in table 14 respectively Appendix III: Market Concept Schedule are important to put the Helvetas-IDE drip project on a solid foundation, summarize important findings and give an overview how to proceed in the market creation process in the short-mid term.
The situation presented is realistic and two years from now, the entire supply chain consisting of Kyrgyz, Chinese and possibly

Indian plastic producers, a wholesaler, commercial retailers, NGOs, cooperatives and satisfied farmers will work efficiently and Helvetas-IDE will be able to focus its support exclusively on promotional activities to generate demand not only for the specific low-cost DIS, but for drip technology in general.

It has to be stressed that regarding financial and technical support for individual stakeholders in the supply chain a balance has to be found between the narrow goal of profit of specific players and the overall goal of creating the market. The risk might be that some stakeholders will focus on a richer clientele only and ignore poorer small holder farmers living in more remote areas. It is however assumed that if a market exists for commercial, larger drip irrigation systems, poor farmers in remote areas will also get access to the technology in the mid term. Therefore in order to reach the latter Helvetas-IDE project needs to first target better-off, more innovative and risk-taking farmers. Poorer farmers in Kyrgyzstan will first need to have seen the systems working successfully with their neighbors before they will dare to adopt it.

It is important to keep in mind that creating a market for drip technology and changing in this way also the cultivation methods of many farmers will need time and will require considerable expenses not only for the promotion of drip technology specifically, but for the training of farmers in general how to rightfully irrigate.

Moreover farmers need to be convinced that drip technology not only allows using water efficiently, but that it can generate higher incomes in order that they will start using it. This however requires a certain entrepreneurial spirit of farmers as to how to make most out of their land owing, which is difficult to create by the Helvetas-IDE project itself. In this regard the most promising option in the initial phase of the market creation process is certainly focusing efforts of the project and of its partner organizations on innovative, risk taking farmers that play the role of opinion leaders in their communities and influence the behavior and agricultural techniques of surrounding farmers.

As soon as the market for low-cost DIS in Kyrgyzstan will offer sustainable benefits for all stakeholders in the supply chain, i.e. high enough turnovers are being generated and also poorer small holder farmers will start buying and using drip technology in more remote areas, Helvetas-IDE will have truly overcome the three challenges – promotion, supply chain and local procurement – and can call itself a success.

The goal in the long term must be a vivid, many stakeholders involving market for drip technology in Kyrgyzstan and desirably other Central Asian countries independent of any donor support, in which all the parties involved act out of their own (financial) interest and all farmers, rich and poor, small and big, have the option to use various forms of drip on their fields.

The start for this goal has been initiated. Let's continue to work towards this end.

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9. Appendix

Appendix I: Work Plan

Work Plan for internship of Markus Brauchli

Goal:

Creation of a market for drip irrigation systems in Kyrgyzstan

Objective:

Development of a market concept at all levels from producer to the farmer for the creation of a supply chain for drip irrigation systems in Kyrgyzstan.

Expected Results (ER)
ER 1: **Identification of potential wholesalers and analysis of opportunities and risks of collaboration**
ER 2: **Identification of potential retailers and analysis of opportunities and risks of collaboration**
ER 3: **evaluation and assessment of profitability of the sales of drip irrigation systems at each level of the supply chain (i.e. at wholesaler, retailer and farmer level)**
ER 4: **Identification and assessment of existing and potentially new leverage points for introducing drip irrigation in various forms (i.e. high quality, expensive as well as low-cost drip irrigation systems)**
ER 5: **evaluation of the potential and profitability for production of drip irrigation in Kyrgyzstan (either partial or whole production of drip irrigation systems)**
ER 6: **Publishing and Sharing of results of research with all stakeholders, i.e. final report "Market concept for Drip Irrigation Systems in Kyrgyzstan"**

Activities

ER 1: Identification of potential wholesalers and analysis of opportunities and risks of collaboration					
Activity name	**Activity fully formulated (what, how, how much)**	**Who**	**Where**	**Time needed (days)**	**Comments (e.g. transport needs, etc.)**
1.1. Interviews with wholesalers	Conduct interviews with ZOKI, Agroline, Cooperative in Batken, Ukrainian company, Association of Agrobusinessmen and other potential wholesalers	Markus with responsible person(s) of organization	Osh, Jalalabad, Batken	10	Transport and possibly accommodation in visited areas LP provides contacts
1.2. Warehouse visit	Analysis of the current warehouse system, making suggestions to ZOKI for improved warehouse management, get in contact with Nadja Kränzlin in Central America and Alma Lizarraga from IDE Denver	Markus, Kushbak from ZOKI, Nadja Kränzlin and Alma Lizarraga	Osh	3	Taxi to warehouse
1.3. Data base of partners	Elaboration of a data base of responsible persons and contact information of them;	Markus	Osh	1	

	will be included in the final report				
1.4. Call for tender procedure	Elaboration of criteria for a potential call of tender procedure in the future	Markus	Osh	1	
1.5. Contractual Relationship	Assess and specify contractual relationship between Importers/producers-WHOLESALER-retailer(s)	Markus with the aid of Nadja Kränzlin, Alma Lizarrage, Urs Heierli	Osh	2	

ER 2: Identification of potential retailers and analysis of opportunities and risks of collaboration					
Activity name	**Activity fully formulated (what, how, how much)**	**Who**	**Where**	**Time needed (days)**	**Comments (e.g. transport needs, etc.)**
2.1. Interviews with Retailers	Conduct interviews with agro-shops, NGOs, agribusinesses and partners of the SEP project regarding their involvement as retailers in a drip irrigation supply chain.	Markus with responsible person(s) of organization	Osh, Jalalabad, Batken	30	Transport and possibly accommodation in visited areas
2.2. Data base of partners	Elaboration of a data base of responsible persons and contact information, will be included in the final report	Markus	Osh	1	
2.3. Contractual Relationships	Assess and specify contractual relationships between wholesalers-RETAILER(S)-farmers	Markus with the aid of Nadja Kränzlin, Alma Lizarrage, Urs Heierli	Osh	2	

ER 3: evaluation and assessment of profitability of the sales of drip irrigation systems at each level of the supply chain (i.e. at wholesaler, retailer and farmer level)					
Activity name	**Activity fully formulated (what, how, how much)**	**Who**	**Where**	**Time needed (days)**	**Comments (e.g. transport needs, etc.)**
3.1. Interviews with farmers already using drip irrigation	Interviews with farmers already using drip irrigation systems (Chinese, Indian or other (self-made)) regarding gross margins, price and product expectations (size, quality, etc.); number of interviews ca. 20 Also check and verify the studies of Agroline 2010 and ZOKI 2009 regarding gross margins, price and product expectations.	Markus with farmers allover the South of Kyrgyzstan	Osh, Jalalabad, Batken	15	Transport and possibly accommodation in visited areas
3.2. Interviews with	Interviews with farmers not using drip	Markus with farmers	Osh,	15	Transport and

farmers not using drip irrigation systems	irrigation (big and small holder farmers also in remote areas) as to price and product expectations; number of interviews: ca. 20 Also check and verify the studies of Agroline 2010 and ZOKI 2009 regarding product and price expectations.	allover the South of Kyrgyzstan	Jalalabad, Batken		possibly accommodation in visited areas
3.3. Analysis of Interviews of with wholesalers	Focusing on financial analysis and projections (profit-loss) and possible investment plans. The goal is to find minimum necessary margins at the wholesaler level	Markus	Osh	3	
3.4. Analysis of Interviews with retailers	Focusing on financial analysis and projections (profit-loss) and possible investment plans. The goal is to find minimum necessary margins at the retailer level	Markus	Osh	3	
3.5. Micro Finance	Evaluation and assessment of existing micro finance schemes	Markus	Osh	2	can be part of the interviews; most NGOs have micro-finance branches or are in collaboration with micro-finance institutes

ER 4: Identification and assessment of existing and potentially new leverage points for introducing drip irrigation in various forms (i.e. high quality, expensive as well as low-cost drip irrigation systems)					
Activity name	**Activity fully formulated (what, how, how much)**	**Who**	**Where**	**Time needed (days)**	**Comments (e.g. transport needs, etc.)**
4.1. Identification of marketing activities	Talking to all partners of the SEP project in order to identify existing marketing activities	Markus with partners	Osh, Jalalabad, Batken	15	Transport and possibly accommodation in visited areas
4.2. Analysis of interviews with (potential) Retailers	Analysis of existing marketing channels of (potential) Retailers, what kind of marketing activities and in which regularity they are conducted	Markus	Osh	3	
4.3. Identification of possible partners for marketing activities	Identification and possibly interviews with NGOs and other institutions (e.g. cooperatives, agro-consultants, etc.) involved with farmers in the south of Kyrgyzstan in order to assess the	Markus with responsible partners	Osh, Jalalabad, Batken	15	Transport and possibly accommodation in visited areas

	potential of partnership for marketing activities				
4.4. Analysis of Interviews with farmers	Analysis of interviews with farmers regarding most effective marketing channels to reach them	Markus	Osh	3	
4.5. Analysis of interviews with wholesalers	Analysis of existing marketing channels of wholesalers, what kind of marketing activities and in which regularity they are conducted	Markus	Osh	3	
4.6. Specification of marketing channels and activities	Assessment and specification of existing and potentially new marketing channels for the introduction of drip irrigation systems in Kyrgyzstan, elaboration of a marketing timetable in the years to come and clarification of responsibilities	Markus	Osh	3	

ER 5: evaluation of the potential and profitability for production of drip irrigation in Kyrgyzstan (either partial or whole production of drip irrigation systems)					
Activity name	**Activity fully formulated (what, how, how much)**	**Who**	**Where**	**Time needed (days)**	**Comments (e.g. transport needs, etc.)**
5.1. Interviews plastic producers	Conduct interviews with plastics producers in Kyrgyzstan, but with a focus on the South of Kyrgyzstan	Markus with responsible person(s)	Whole of Kyrgyzstan but focus on Osh, Jalalabad, Batken	10	Transport and possibly accommodation in visited areas
5.2. Data analysis	Processing of data collected in the interviews with potential producers of drip irrigation	Markus	Osh	3	
5.3. Contractual Relationships	Assess and specify contractual relationship between PRODUCER – Wholesaler	Markus with the aid of Nadja Kränzlin, Alma Lizarrage, Urs Heierli	Osh	2	

ER 6: Publishing and Sharing of results of research with all stakeholders, i.e. final report "Market concept for Drip Irrigation Systems in Kyrgyzstan"					
Activity name	**Activity fully formulated (what, how,**	**Who**	**Where**	**Time**	**Comments**

	how much)			**needed (days)**	**(e.g. transport needs, etc.)**
6.1. Workshop preparation	Preparation of a meeting with stakeholders in the supply chain for drip irrigation systems in Kyrgyzstan	Markus with partners of the SC	Osh	2	
6.2. Workshop Meeting	Meeting with stakeholders from all levels of the supply chain	Markus with partners of the SC	Osh or different practical location	1	Maybe meeting should take place at the same time as other regular SEP partner meetings
6.3. Elaboration of final report	Elaboration of final report	Markus	Osh	5	

Timeline

Working days available from 21st February 2011 until 3rd June 2011: 75 days

Working schedule

No.	Activity Name	Calendar (2nd line is date of Monday of the week)																	
		9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
		28.2	7.3	14.3	21.3	28.3	4.4	11.4	18.4	25.4	2.5	9.5	16.5	23.5	30.5	6.6	13.6	20.6	27.6
ER 1: Identification of potential wholesalers and analysis of opportunities and risks of collaboration																			
1.1.	Interviews with wholesalers																		
1.2.	Warehouse visit																		
1.3.	Data base of partners																		
1.4.	Call for tender procedure																		
1.5.	Contractual Relationship																		
ER 2: Identification of potential retailers and analysis of opportunities and risks of collaboration																			
2.1.	Interviews with Retailers																		
2.2.	Data base of partners																		
2.3.	Contractual Relationships																		
ER 3: evaluation and assessment of profitability of the sales of drip irrigation systems at each level of the supply chain																			
3.1.	Interviews with farmers already using drip irrigation																		
3.2.	Interviews with farmers not using drip irrigation systems																		
3.3.	Analysis of Interviews of with wholesalers																		
3.4.	Analysis of Interviews with retailers																		
3.5.	Micro Finance																		
ER 4: Identification and assessment of existing and potentially new leverage points for introducing drip irrigation in various forms																			
4.1.	Identification of marketing activities																		
4.2.	Analysis of interviews with (potential) Retailers																		
4.3.	Identification of possible partners for marketing activities																		
4.4.	Analysis of Interviews with farmers																		
4.5.	Analysis of interviews with wholesalers																		
4.6.	Specification of marketing channels and activities																		
ER 5: evaluation of the potential and profitability for production of drip irrigation in Kyrgyzstan																			
5.1.	Interviews plastic producers																		
5.2.	Data analysis																		
5.3.	Contractual Relationships																		
ER 6: Publishing and Sharing of results of research with all stakeholders																			
6.1.	Workshop preparation																		
6.2.	Workshop Meeting																		
6.3.	Elaboration of final report																		

Appendix II: Interview Summary

Interview Partner	Date	Questionnaire
Jooshev Payazidin, ZOKI	25.02.2011	Wholesaler
Chaljapov Ilkin, Emil Nasyrov, Agroline Ltd.	04.03.2011	Wholesaler
Abdraimov Taalay, Agroconsulting	09.03.2011	Marketing Partner
Abdipata Mataev, RAS Batken	14.03.2011	SEP Partner
Халмурзаев Абдирашит Назирбекович, Union of Cooperatives “Mol Tushum”	14.03.2011	Retailer
Абдухаликов Хасан, farmer in Tajikistan	15.03.2011	Farmer using drip irrigation
Толибов Мухсин, agro shop in Khujand, Tajikistan	15.03.2011	Retailer
Mamatkulov Shavkat, DCCA Osh	22.03.2011	SEP Partner
Ismailov Artur; RAS Osh	22.03.2011	SEP Partner
Chynybek Mamytov, Agroline Ltd.	22.03.2011	SEP Partner
Кымбат Чудубаева, ОсОО «Агрозооветсервис»	24.03.2011	Retailer
Saypitdin, Plastic Tube Production, Jalalabad	30.03.2011	Plastic Producer
Bahram, Plastic Tube Production, Jalalabad	30.03.2011	Plastic Producer
Sabir Chusak, Agro shop “Mir Cemjan”, Jalalabad	30.03.2011	Retailer
Salahidin, Plastic Molding, Jalalabad	11.04.2011	Plastic Producer
Ian Barnard, Refinery in Jalalabad	11.04.2011	Plastic Producer
Valery Kutimov, Plastic Production, Bishkek	15.04.2011	Plastic Producer
Saryboev Acejin Shumaevic, farmer	16.04.2011	Farmer interested in using drip irrigation
Galina Tashieva, Agrimatco Ltd.	18.04.2011	Retailer
Gulnaz Kaseeva, Public Union AgroLead	18.04.2011	Retailer

Dabke Kedap/Daniyarova Aman, Seagulls International Ltd.	19.04.2011	Wholesaler/Retailer
Alim, Injection molding and extrusion, Bishkek	20.04.2011	Plastic Producer
Mustafa, extrusion plant and importer of Turkish drip systems	20.04.2011	Plastic Producer
Bachri, Chicar Ltd., Producing of bottles and big tube, Bishkek	20.04.2011	Plastic Producer
Bishkek Plastic Ltd., not producing anymore	20.04.2011	Plastic Producer
Russian Plastic Bag Production, Bishkek	20.04.2011	Plastic Producer
Bülent/Mehmet, Turkish tube manufacturer, Bishkek	20.04.2011	Plastic Producer
Celebi Group, PVC Production, Bishkek	21.04.2011	Plastic Producer
Orchard farmer, Toolos	03.05.2011	Farmer
Orchard farmer 2, Toolos	04.05.2011	Farmer
Greenhouse farmer, Uzgen	06.05.2011	Farmer
Orchard farmer, Aravan	10.05.2011	Farmer
Orchard farmer, Kysyl-Bajrak	13.05.2011	Farmer
Home gardener, Osh	15.05.2011	Farmer
Orchard farmer, Achy	17.05.2011	Famer
Greenhouse farmer, Aravan	20.05.2011	Farmer
Imanbetova Ajnura, Union of Cooperatives of Kyrgyzstan	03.06.2011	Retailer

Appendix III: Market Concept Schedule

Year	Quarter	Promotion	Supply Chain Creation	Local/ Chinese Production/Procuring	Evaluation/ Controlling
2011	Q2	-Demonstrational plots all over the south of Kyrgyzstan -field days -installation Manual for farmers -Leaflets/banner -			
	Q3	- field days - product catalog for retailers - Demonstrational plot in Tajikistan -sale and installation of Chinese laterals -preparation of sale season fall 2011	-clarification of need for second container from India or China in cooperation with wholesaler -elaboration of call for tender conditions -possibly importation of spare parts either via ZOKI or new wholesale partner from China	-clarification of warranty issues with GEWP	
	Q4	- Manual for Retailers (ToT) -Preparation of marketing campaign 2012 in Kyrgyzstan -identification of more remote areas for the promotion of drip -Preparation of marketing campaign in Tajikistan -assessment of micro credit institutions - analysis of the demo plots in 2011 for promotional material in 2012	-Call for tender for 2nd container - Agreement with new wholesaler for 2012 -assessment of 2011 and identification of retailers for 2012 -contact with cooperatives -Agreements with Retailers/ wholesalers in Tajikistan - possibly looking for partners in Uzbekistan, Kazakhstan, Turkmenistan -assessment of microfinance payback schemes based on 2011 figures -identification of microfinance institutions	- clarification of sourcing for 2012 in cooperation with wholesaler -China: evaluation of where to source what in cooperation with wholesaler -possibly agreement with Kyrgyz plastic producer for production of main tubes and thicker 16mm laterals in cooperation with wholesaler	-Evaluation of marketing activities/material/partners -Market creation progress analysis -decision about terms of reference in Tajikistan and other Central Asian countries
2012	Q1	- Manual for Retailers -Preparation of marketing campaign 2012 in Kyrgyzstan -Preparation of marketing campaign in Tajikistan -possibly identification of demonstration plots in Uzbekistan, Kazakhstan, Turkmenistan -agreements with microcredit institutions and linking to wholesaler/retailers	- Delivery of DIS and promotional materials to various partners all over Kyrgyzstan in cooperation with wholesaler -delivery of some systems and promotional materials to Tajikistan -agreements with microfinance institutions	- possibly agreement with Kyrgyz and Chinese plastic producers for production of laterals, micro tubes, 16mm valves in Kyrgyzstan or China in cooperation with wholesaler (low-cost design)	
	Q2	- participation in agricultural fairs -demonstration plots, also in remote areas -leaflets/banners - field days, also in remote areas - mass media		-possibly agreements with various producers in Kyrgyzstan/China for production of remaining parts in cooperation with wholesaler (low-cost design)	
	Q3	-demonstration plots, also in remote areas - field days, also in remote areas		-possibly agreements with various producers in Kyrgyzstan/China for production of remaining	

		-possibly demonstration plots in Uzbekistan, Kazakhstan, Turkmenistan		parts in cooperation with wholesaler (low-cost design)	
	Q4	-Preparation of marketing campaign 2013 in Kyrgyzstan, Tajikistan and possibly other Central Asian countries	- agreements with retailers based on the experiences made in 2012 also in Tajikistan and possibly Uzbekistan, Kazakhstan, Turkmenistan	-possibly agreements with various producers in Kyrgyzstan/China for production of remaining parts in cooperation with wholesaler (low-cost design)	-Evaluation of marketing activities/material/partners -Market creation progress analysis -possibly decision about terms of reference in Uzbekistan, Kazakhstan, Turkmenistan
2013	**Q1**	-Preparation of marketing campaign 2013 in Kyrgyzstan, Tajikistan and possibly other Central Asian countries	- Delivery of DIS and promotional materials to various partners in cooperation with wholesaler	-possibly agreements with various producers in Kyrgyzstan/China for production of remaining parts in cooperation with wholesaler (low-cost design)	
	Q2	-Mass media in Kyrgyzstan		-possibly agreements with various producers in Kyrgyzstan/China for production of remaining parts in cooperation with wholesaler (low-cost design)	
	Q3	-Mass Media in Kyrgyzstan		-possibly agreements with various producers in Kyrgyzstan/China for production of remaining parts in cooperation with wholesaler (low-cost design)	
	Q4	-preparation of marketing campaign 2014		-possibly agreements with various producers in Kyrgyzstan/China for production of remaining parts in cooperation with wholesaler (low-cost design)	-Evaluation of marketing activities/material/partners -Market creation progress analysis

Appendix IV: Price Calculation KB Drip Irrigation Systems

Price calculation KB Drip Irrigation Systems 2011/ Калькуляция цен на системы капельного орошения KB			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
			КОМПЛЕКТ КОМПОНЕНТОВ СИСТЕМЫ СЕЛЬСКОХОЗЯЙСТВЕННОГО КАПЕЛЬНОГО ОРОШЕНИЯ ДЛЯ ЯБЛОНИ (ПЛОЩАДЬ -ОДИН ГЕКТАР, РАЗМЕЩЕНИЕ - 6.0 Мх5.0 М)	КОМПЛЕКТ КОМПОНЕНТОВ СИСТЕМЫ СЕЛЬСКОХОЗЯЙСТВЕННОГО КАПЕЛЬНОГО ОРОШЕНИЯ ДЛЯ УРЮКА (ПЛОЩАДЬ -ОДИН ГЕКТАР, РАЗМЕЩЕНИЕ - 8.0 Мх6.0 М)	КОМПЛЕКТ КОМПОНЕНТОВ СИСТЕМЫ СЕЛЬСКОХОЗЯЙСТВЕННОГО КАПЕЛЬНОГО ОРОШЕНИЯ ДЛЯ ВИШНИ (ПЛОЩАДЬ -ОДИН ГЕКТАР, РАЗМЕЩЕНИЕ - 5.0 Мх5.0 М)	КОМПЛЕКТ КОМПОНЕНТОВ СИСТЕМЫ СЕЛЬСКОХОЗЯЙСТВЕННОГО КАПЕЛЬНОГО ОРОШЕНИЯ ДЛЯ ПОМИДОРОВ (ПЛОЩАДЬ - 6000 КВ М , РАЗМЕЩЕНИЕ - 0.6 Мх0.4 М)	КОМПЛЕКТ КОМПОНЕНТОВ СИСТЕМЫ СЕЛЬСКОХОЗЯЙСТВЕННОГО КАПЕЛЬНОГО ОРОШЕНИЯ ДЛЯ ПОМИДОРОВ (ПЛОЩАДЬ - 1000 КВ М , РАЗМЕЩЕНИЕ - 0.6 Мх0.4 М)	КОМПЛЕКТ КОМПОНЕНТОВ СИСТЕМЫ СЕЛЬСКОХОЗЯЙСТВЕННОГО КАПЕЛЬНОГО ОРОШЕНИЯ ДЛЯ ПОМИДОРОВ ПЛОЩАДЬ - 200 Sq.Mtr, РАЗМЕЩЕНИЕ - 0.6 Мх0.4 М)	Нажимный педальный насос	Электрический погружной насос (1 Фаза)	КВ Система распрыскивателей на 2000 кв. м (Размещение - 11х8 м) со стринжной стойкой, запчастями и трубками	Капельница (100 комплектов)	Запасные Части
						Нет в наличии							
количество	number		4	4	4	8	24	50	3	1	2	200	3
доля стоимости франко-завод	*share of value ex works*		*9%*	*9%*	*10%*	*26%*	*24%*	*11%*	*2%*	*2%*	*3%*	*1%*	*3%*
Цена GEWD франко-завод	**Price GEWD ex works**		**376,51**	**360,71**	**393,51**	**520,30**	**157,28**	**35,10**	**132,00**	**333,00**	**217,07**	**1,00**	**158,89**
+Погрузочно-разгрузочные работы, Расфасовка, Транспортировка, Таможенные расходы	+ loading works, packing, transportation, customs costs		9,38	8,99	9,80	12,96	3,92	0,87	3,29	8,30	5,41	0,02	3,96
Цена FOB Индия	**Price FOB India**		**385,89**	**369,70**	**403,31**	**533,26**	**161,20**	**35,97**	**135,29**	**341,30**	**222,48**	**1,02**	**162,85**
Международные транспортные расходы	International transportation costs		74	71	78	103	31	7	26	66	43	0	31
Цена CIF (стоимость, страховка, фрахт) Кыргызстан	**Price CIF Kyrgyzstan**		**460,21**	**440,89**	**480,98**	**635,96**	**192,24**	**42,90**	**161,34**	**407,02**	**265,32**	**1,22**	**194,21**
+ таможенные налоги (%)	plus custom costs (%)		71	68	75	99	30	7	25	63	41	0	30
+ разгрузка, очистка, местная	plus loading, cleaning, local		13	13	14	18	6	1	5	12	8	0	6
Закупочная цена для оптовика	**Purchase price for wholesaler**		**544,96**	**522,09**	**569,57**	**753,08**	**227,65**	**50,80**	**191,06**	**481,99**	**314,19**	**1,45**	**229,98**
+ хранение (за год)	storing (for 1 year)		24,33	23,31	25,43	33,63	10,16	2,27	8,53	21,52	14,03	0,06	10,27
+ затраты персонала оптовик	wholesale worker staff		14,60	13,99	15,26	20,18	6,10	1,36	5,12	12,91	8,42	0,04	6,16
+ мероприятия по продвижению оптовик	wholesaler promotion activities		2,53	2,43	2,65	3,50	1,06	0,24	0,89	2,24	1,46	0,01	1,07
+ административные затраты	administrative costs		12,17	11,66	12,72	16,81	5,08	1,13	4,27	10,76	7,01	0,03	5,13
Стоимость цены оптовика	**Cost price wholesaler**		**598,60**	**573,48**	**625,63**	**827,20**	**250,05**	**55,80**	**209,86**	**529,42**	**345,11**	**1,59**	**252,61**
наценка оптовика (аккумулируется в фонде СКО)	*wholesaler's margin (goes to drip-fund)*		*7%*	*7%*	*7%*	*7%*	*7%*	*7%*	*7%*	*7%*	*7%*	*7%*	*7%*
прибыль оптовика (аккумулируется в фонд СКО)	income for wholesaler (goes to drip-fund)		41,90	40,14	43,79	57,90	17,50	3,91	14,69	37,06	24,16	0,11	17,68
Налоги к уплате оптовика (3% налог с продаж от стоимости товара и 10 % налог на прибыль от суммы наценки)			22,15	21,22	23,15	30,61	9,25	2,06	7,76	19,59	12,77	0,06	9,35
Закупочная цена оптового торговца	**Purchase price for retailer**		**662,65**	**634,84**	**692,57**	**915,71**	**276,81**	**61,78**	**232,32**	**586,07**	**382,04**	**1,76**	**279,64**
Стоимость цены для розничного торговца со склада в Оше	**Cost price retailer from the warehouse Osh**		**662,65**	**634,84**	**692,57**	**915,71**	**276,81**	**61,78**	**232,32**	**586,07**	**382,04**	**1,76**	**279,64**
наценка розничного торговца в %	*percentage of margin of retailer*		*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
наценка розничного торговца	margin of retailer		132,53	126,97	138,51	183,14	55,36	12,36	46,46	117,21	76,41	0,35	55,93
Закупочная цена для фермера	**Purchase price for the farmer**		**795**	**762**	**831**	**1099**	**332**	**74**	**279**	**703**	**458**	**2**	**336**

Appendix V: Price Comparison Indian, Kyrgyz or Chinese Production

Price Comparison Indian, Kyrgyz or Chinese Production in US$ (exchange rate: 1US$ = 46,958Som)										
	Indian Production			Kyrgyz Production		Chinese Production		Comparison		
	Price GEWP India ex works (US$)	Price for wholesaler in Kyrgyzstan (loading works, packing, transportation, customs costs in India/International transportation costs/Kyrgyz Custom Costs and Transportation to Osh) ~144% of Price GEWP ex works	Price for Retailer in Kyrgyzstan ex warehouse ~120% of wholesaler price	Price Kyrgyz Production ex works	Possible Price for Retailer ex warehouse ~120% of wholesaler price	Price Chinese Production ex works	Possible Price for Retailer ex warehouse (including 500US$/tonne transportation and customs cost and wholesaler's	Price on local Market (Bishkek, Jalalabad, Osh) (Som)	Difference of price in % in case of Kyrgyz Production	Difference of price in % in case of Chinese Production
		1.45	1.22		1.22					
Lay Flat Pipe 63 mm (2") 900 micron - 1kg - 6m	3.85	5.56	6.76	4.00	4.86	1.50	2.43		-28.1	-64.0
Drip Laterals 250 micron Plain - 1kg - 80m (± 5m)	3.40	4.91	5.97	4.00	4.86	1.50	2.43		-18.6	-59.3
Micro Tube cut into 20cm pieces - per piece	0.004	0.006	0.007	0.004	0.005	0.002	0.002		-30.8	-65.4
Take off valve 16mm - per piece	0.11	0.16	0.19	0.03	0.04				-79.9	
Joiners 16mm - per piece	0.04	0.06	0.07	0.03	0.03				-56.7	
Flush Valve 63 mm	1.27	1.84	2.23							
Ball Valve 63mm - per piece	2.90	4.19	5.10					250		
Ball Valve 25mm - per piece	0.83	1.20	1.46					80		
PVC Pipe 30,5cm - 63mm - per piece	0.39	0.56	0.69					12.50		
PVC Elbow 63 mm - per piece	0.57	0.82	1.00					30.00		
Plastic Screen Filter 5m3/hour - 63mm - per piece	9.86	14.25	17.32							
Plastic Screen Filter - 25mm - per piece	4.72	6.82	8.29							
Metal Screen Filter 20 m3/hour - per piece	37.00	53.47	65.01							
Rubber Grommets 16 mm - per piece	0.03	0.04	0.05							

Appendix VI: interview Guidelines

Questionnaire

Farmer not using drip irrigation

Interviewee

Name: Contact: Family size: Age: Location:

Farm management

Farm size:

Which crops/orchards/fruits/etc. are cultivated?

Does the farmer use the yield for home consumption or for selling the products?

Potential for the use of drip irrigation

Existence of water shortages?

Is drip irrigation technology known? What is known about it? (e.g. benefits, risks)

In which circumstances the farmer would be willing to buy drip irrigation systems? (e.g. less rainfall, low-costs of the system, proven raise of income) If not, then why?

What price would the farmer be willing to pay for a drip irrigation system on his plot? (e.g. price for 200 square meters) How profitable should the use of drip irrigation systems be, i.e. how quickly does the farmer want to be able to repay the costs of the drip irrigation system?

Distribution Channels

Where does the farmer buy agricultural inputs?

Marketing Channels

Where does the farmer get information regarding agricultural practices from (e.g. irrigation practices)?

Does the farmer have access to credit? (e.g. micro-finance) On what conditions, interest rates?

Remarks:

Remarks: (e.g.: personal impression of prosperity of the farmer)

Questionnaire
Farmer using drip irrigation

Interviewee

Name: Contact: Family size: Age: Location:

Farm management

Farm size:

Which crops/orchards/fruits/etc. are cultivated?

Drip irrigation

What kind of drip irrigation system is the farmer using? (KB, Chinese, Kyrgyz product or self made?) Since when?

Why is the farmer using drip irrigation? (Water saving, labour saving, use of drip irrigation in greenhouses, higher product quality, higher yields, etc.?)

For what purposes does the farmer use the system? (E.g. kitchen gardens for home consumption (food security) or selling the crops in markets (higher income)?)

How much did the farmer pay for the drip irrigation system? (Electronic pump, installation costs, water storage, etc.)

Where does the farmer get spare parts or information from in case of problems of the drip irrigation system?

Is the farmer satisfied with his drip irrigation system and will continue to use it? If not, what are the problems?

Distribution Channels

Where does the farmer purchase agricultural inputs?

Marketing Channels

Where does the farmer get information from regarding agricultural practices?

Does the farmer have access to credit? (e.g. micro-finance) What conditions, interest rates?

Profitability

How long does it take the farmer to repay the costs for the drip irrigation system he is at the moment using? (How much cash return does the drip irrigation system generate for example within one year compared to the purchase price?)

Remarks:

Remarks (e.g.: personal impression of prosperity of the farmer)

Interview Guide

Plastic Producer

Interviewee

Company: Name: Position: Contact:

Company Information

Location

Number of employees, sales, profits?

Machinery and plants?

Products

What package of products and services are offered to partners/customers? (national or international)

What parts of a drip irrigation system are you able to produce?

How do you guarantee for the quality of the produced goods?

What specific knowledge do you have about plastic products (e.g. different materials with different characteristics)?

Distribution and Communication Channels

Through which means/channels are the partners/customers reached?

- Distribution (e.g. means of transport, logistics, etc.)
- Communication (e.g. electronic, non-electronic)

Raw Material

What kind of raw materials do you use?

Where do you purchase the raw material? Does the company have experiences in international sourcing?

Warehouse System

Do have experiences in the management of a warehouse? What kind of products? Where is your warehouse located?

Cost Structure and Revenues

Which are the cost positions? (E.g. employees, machinery, etc.)

How much does electricity cost?

How much does labour cost?

How much do the raw materials cost?

What are the company's average profit margins?

For how much could you sell these parts or a whole drip irrigation system? (per piece)

Remarks:

Remarks:

Interview Guide

Marketing Partners (possible new partners)

Interviewee

Institution:
Name:
Position:
Contact:
Location:

Opportunities and Risks

Are you interested in the promotion of drip irrigation in Kyrgyzstan?

Location(s) of activities:

Since when do you exist? How do the farmers find out about the existence of your organisation and your services?

What kind of activities/services do you conduct and provide to the farmers?

What kind of materials are you using? (E.g. trainings, demo-plots, leaflets, wall-paintings, movies, etc.)

Do the farmers pay for your services? If not, how is your organisation/institution financed?

Who is providing you with the necessary information and materials for your activities?

Remarks:

Remarks:

Interview Guide

Retailer

Interviewee

Institution: Name: Position: Contact:

Identification of Retailers

Location:

Are you interested in becoming a retailer for drip irrigation systems?

How many drip irrigation systems do you think you can sell per season and which types/sizes?

What margins do you need to be profitable?

Opportunities and Risks

What package of products and services are offered to the customer/farmers?

Where do the farmers live that buy your products/services?

Is there a quality control for the products/services you offer and do you have a warranty system for some of your products?

Do you have a micro finance system included in your activities? How does it function?

Distribution and Promotional Channels

Through which means/channels are the customers/farmers reached?

- Distribution (do you deliver or only sell on the spot)
- Promotion (activities, materials, regularity):

Procurement System of Products (if any)

Where do they get information specifically about drip irrigation and other products from? Who are their main suppliers?

How is the money flow organised? Are they just linking farmers with agro-input suppliers or do they buy from wholesalers and re-sell?

Customer Relationship

What kind of customer data do you collect? How do you keep track of your customers?

Remarks:

Remarks:

Interview Guide

Marketing Partners (SEP-partners)

Interviewee

Institution: Name: Position: Contact: Location:

Opportunities and Risks

About the Partner

Location(s) of activities:

How do the farmers find out about the existence of your organisation and your services?

Drip Irrigation

Do you see a potential for the use of Drip Irrigation Technology in Kyrgyzstan? What about other Central Asian countries?

Are you selling drip irrigation systems in the frame of the SEP project? How many systems did you already sell, what kind and for what price?

Marketing

What kind of activities regarding the promotion of drip irrigation have you conducted so far, are you conducting right now, do you plan to conduct in the future? (Timetable?)

What kind of materials are you using? (E.g. demo-plots, leaflets, wall-paintings, movies, etc.)

Who is providing you with the necessary information and materials for the promotion of drip irrigation?

In your regard how shall drip irrigation technology be marketed? What kind of activities, materials and when?

What kind of systems shall be marketed and sold in which geographical regions?

In order that also poor farmers can buy drip irrigation systems, what price levels would you suggest?

Distribution

What kind of distribution channels shall be used? Commercial of non-commercial actors?

What level of margins do you consider as realistic on wholesaler as well as retailer level?

Remarks:

Remarks:

Interview Guide

Wholesaler

Interviewee

Institution: Name: Position: Contact:

Identification of potential wholesalers

Location:

Are you interested to act as a wholesaler for drip irrigation systems in Kyrgyzstan?

If yes, under which conditions?

If not, what are the reasons?

Risks and Opportunities

Product Line-up and Quality Control

What package of products and services are offered to the partners/customers?

Is there a quality control of the products/services?

Partners/Customers: Relationship and Location

Who are the partners/customers?

Where are the partners/customers located?

What kind of relationship is established with the partners/customers and how it is maintained?

What kind of problems do you encounter with your partners/customers?

What kind of customer data is collected? How do you keep track of your customers?

Are there any experiences regarding a warranty system?

Distribution and Promotional Channels

Through which means/channels are the partners/customers reached?
• Distribution (retailers, shops, markets, transports)? • Promotion (activities, materials, regularity)?

Procurement Channels

What kind of products do you import from which country?

Can you import from India? What experiences do you have? What products and with what partners? How long in your estimation does it take to import from India?

Warehouse System

Do have experiences in the management of a warehouse? What kind of products? Where is your warehouse located?

Revenue:

What level of profit margin (in percentage) would you expect when selling drip irrigation systems as a wholesaler?

From your experience, what is the minimum turnover to make a product profitable for you (in Mio KGS)?

In your view what is the market capacity for drip irrigation in Kyrgyzstan? Estimation?

Remarks:

Remarks:

Appendix VII: Urumqi Mission Report:

REPORT (DRAFT): EXPLORATION MISSION TO URUMQI TO IDENTIFY AFFORDABLE DRIP IRRIGATION TECHNOLOGIES FOR KYRGYZSTAN IN JUNE 2011

Prepared by

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Prepared for

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International Development Enterprises

Bishkek, June 2011 (draft)

INTRODUCTION

SEP project has since 2010 a component for testing the market of affordable low-cost drip irrigation technologies in Kyrgyzstan. The component is supported by IDE under a SDC funded global water project and is currently testing the demand of KB brand systems imported from India at farmer level. However, farmers, retailers and plastic producers reported that affordable systems can be found in China and can be imported at moderate costs.

This exploration mission therefore identified available drip irrigation technologies in Urumqi, China and assessed the potential of using (partly) material from China for drip irrigation systems.

Various available materials have been identified and brought to Kyrgyzstan, stores have been visited that sell irrigation material in general and drip irrigation systems specifically.

In Urumqi some plastic manufacturers are operative and produce both tubes of various forms and shapes and other plastic parts via injection moulding.

The whole city of Urumqi and its surroundings is artificially irrigated and therefore much material and knowledge is available. Farmers outside of Urumqi are using drip irrigation both for greenhouses and orchards. No open vegetable production with drip technology has been observed.

However finding partners that sell drip irrigation systems at wholesale or retail level is difficult if local languages are not known, especially Chinese. It is therefore essential to have a reliable partner in China that knows not only the language, but also local traditions and conditions for doing business in general. Thus a possible local partner has been identified who can organize the sourcing of various parts in Urumqi and the shipping to Kyrgyzstan for reasonable service charges.

It has to be stressed however that most of the parts for a complete drip irrigation system are not being produced in Urumqi, but further East in China. Once demand in Kyrgyzstan picks up, it will be more profitable to source these parts directly at the production site and in this way to bypass middlemen in Urumqi.

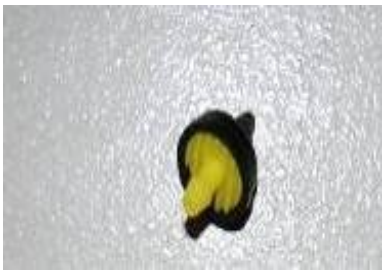
This report presents a catalogue of different parts necessary for a drip system and presently available in Urumqi, indicating prices and product features, further gives price examples about how much it costs to source in and import complete systems from Urumqi and summarizes the costs and conditions of transportation to Kyrgyzstan. Furthermore an overview is presented about the pieces collected and brought to Kyrgyzstan during this mission, a contact list given with indentified people and institutions as well as indications what has been accomplished when and with whom during the mission days.

The report closes with recommendations how to proceed in the near future regarding the sourcing and importation of Chinese drip irrigation technology to Kyrgyzstan.

CATALOGUE

Name	Picture	Price	Quality product features Remarks	Warranty
Plastic Screen Filter		20mm: 120 Com 25mm: 300 Com 50mm: 1195 Com (better quality) 63 mm: 550 Com	flow rates vary as to diameters and water pressure	No warranty, but quality check before shipping
PVC main tube		63mm: 67 Com/m 25mm: 30 Com/m	If sales volume high, price decreases; any diameter available 63mm:Same characteristics as Indian PVC pipes Inner Diameter 59 mm and 2mm wall thickness 25mm:Various wall thicknesses available	No warranty
PVC elbow		63mm: 16 Com/pc	Any diameter available Same characteristics as Indian	No warranty
PVC tees		63mm: 21 Com/pc	Any diameter available Same characteristics as Indian	No warranty

Metal Clamp		10 Com/pc	Diameter 5-7cm	No warranty
PVC ball valve with winding		50mm: 45 Com/pc	Diameter 20 -110mm available They have a winding and come with joiners to attach tubes	No warranty
PVC ball valve without winding		25mm: 28 Com/pc 63mm: 112 Com/pc	Same quality as Indian All also available with winding	No warranty
Take off valve		4.2 Com/pc	Diameter 16mm Better quality than Indian Compatible if Indian grommets	No warranty
Equal joiner		1.75 Com/pc	Diameter 16mm Produced in Urumqi	No warranty, but quality check before shipping
Tee-joiner without rubber grommets		1.96 Com/pc	Diameter 16mm No rubber grommets	No warranty, but quality check before shipping

Tee joiners with rubber grommets		4.5 Com/pc	Diameter 16mm grommets included	No warranty
Lateral with drippers built in		16mm: 2,45 Com/m Price for cheapest quality, thin walls and short drippers with higher flow rates	rolls of 2000m (4'900 Com/110 US$) Distance between drippers 300mm/400mm Above 1t order the distance custom selected Flow rates: 1,8-3,2 liter/hr	No warranty, but quality check before shipping Should work for three years
Normal Dripper		2,10 Com/pc	Flow rate can be regulated via winding (~4-5 liter/hour)	No warranty, but quality check before shipping
Dripper (new generation?)		9 Com/pc	Flow rate can be regulated via winding (~4-5 liter/hour) Price difference to dripper above not clear	No warranty
Flow rate stabilizator		2,10 Com/pc	Especially used for orchard irrigation and sprinklers Flow rate between 4 – 60 liter/hour (class A and class B) No flow rate regulation possible	No warranty, but quality check before shipping

Dripper		3.10 Com/pc	To be directly inserted into the lateral No flow rate regulation possible	No warranty
Flow rate stabilizator		3,10 Com/pc	No flow rate regulation possible	No warranty
Main tube (PP or PE)		77 - 105 Com/kg	Any wall thickness available Any diameter available Produced in Urumqi Indian: 900micron/1kg=6m	No warranty
Plain Lateral (PP or PE)		77 - 105 Com/kg	Any wall thickness available Any diameter available Produced in Urumqi Indian: 125micron/1kg=160 m 250micron/1kg=80m Life span depends on quality of raw materials and wall thickness	No warranty
High quality tee connecter		26.6 Com/pc	Diameter 16 mm without grommet	No warranty

Lateral with drip system built in the top		105 Com/kg (wholesale) 2000m = 2800 Com 1.4 Com/m	Diameter 16mm (can be adapted if ordering more than 500kg) Distance between drippers 300mm/400mm (can be adapted if ordering more than 500kg) Designed for vegetable production	No warranty Designed for one year use only

PRICE EXAMPLES

Vegetable greenhouse 200 square meters

Cultivation schemes 0.7m x 0.3m

Necessary parts	**Details**	**Price**
Ball valves	25 mm without winding, needs to be connected with clue, 28 Com/pc	28 Com
PVC main tube	diameter 25mm, 0,5m necessary	15 Com
Plastic Screen Filter	25mm, 1 piece	300 Com
Sub main tube	25mm, 77 Com/kg, 10m necessary	77 Com
Tee joiners with grommets	16mm, 15 pieces (incl. 3 spare parts), 4.5 Com/piece	67.5 Com
(1) 300m laterals with drippers built in (2) 300m laterals with drip system built in the top	(1) 16mm, 300mm dripper distance (2) 16mm, 300mm dripper distance	(1) 735 Com (2) 420 Com
Price FOB Urumqi (including packing and packing material)		(1) 1222.5 Com /

	27 US$ (2) 907.5 Com / 20 US$
3% service charges of Dilschad Dadabaev (ordering of the goods, transportation of the goods to the logistics center of Urumqi, verification of quantity and quality of goods, observation of packing)	(1) 1259 Com / 27.8 US$ (2) 934 Com / 20.6 US$
International transportation costs and customs cost (estimated), varies as to volume and weight of the goods	588 Com / 13 US$
Purchase price for wholesaler in Kyrgyzstan	(1) 1847 Com / 40.8 US$ (2) 1522 Com / 33.6 US$

The purchase price for the wholesaler in Kyrgyzstan in the case of sourcing in China is considerably cheaper compared to sourcing from GEWP in India for both kinds of laterals (around 20% cheaper for (1) and around 35% cheaper for (2))

The laterals used for both variations (1) and (2) have to be first tested under Kyrgyz conditions. 2000m of both laterals are to arrive in Osh in the second half of June 2011 and should still be tested this year.

In this price example no 16mm take off valves are used, but tee joiners which decreases the costs.

Orchard, 1 ha based on Indian schemes by Sudarshan

Cultivation scheme: 5m x 5m

Necessary parts	**Details**	**Price**
Sub main tube	63mm, 900 micron, 77 Com/kg = 6m, 350m necessary	4'500 Com
Laterals (1) high quality (2) Indian design	2000m necessary (1) 16mm, 77 Com/kg = 20m (2) 16mm, 250micron, 105 Com/kg = 80m	(1) 7'700 Com (2) 2625 Com

Drippers (1) high quality (2) Indian design	410 pieces necessary (including 10 spare parts) (1) flow rate stabilizators: 2.10 Com/pc (2) micro tube: 0,18 Com/pc (Indian price)	(1) 861 Com (2) 74 Com
Plastic Screen Filter	63mm, 1 piece	550 Com
Ball valve	63mm, without winding needs to be connected with glue 102 Com/pc, 6 pieces	672 Com
Take off valves	16mm, 90 pieces (incl. ~10 spare parts), 4.2 Com/piece	378 Com
Grommets	Made for 16mm holes, available in Urumqi, but no price information, calculated as to Indian price ex works: 1,35 Com/pc, 90 pieces necessary	121.50 Com
Joiners	16mm, 10 pieces necessary, 1,75 Com/pc	17.50 Com
PVC elbows	63mm, 16 Com/pc, 2 pieces	32 Com
PVC Tees	63mm, 21 Com/pc, 5 pieces	105 Com
Metal clamps	6-7cm, 10 Com/pc, 25 pieces	250 Com
PVC main tube	63mm, 67 Com/m, 9m	603 Com
Price FOB Urumqi (including packing and packing material)		(1) 15’790 Com / 349 US$ (2) 9’928 Com / 219 US$
3% service charges of Dilschad Dadabaev (ordering of the goods, transportation of the goods to the logistics center of Urumqi, verification of quantity and quality of goods, observation of packing)		(1) 16’263 Com / 359 US$ (2) 10’225 Com / 225

	US$
International transportation costs and customs cost (estimated), varies as to volume and weight of the goods	4'750 Com / 105 US$
Purchase price for wholesaler in Kyrgyzstan	(1) 21'013 Com / 464 US$ (2) 14'975 Com / 330 US$

The purchase price for the wholesaler in Kyrgyzstan in the case of sourcing in China is considerably cheaper compared to sourcing from GEWP in India both for (1) higher quality laterals and flow rate stabilizators (around 20% cheaper) as well as for (2) laterals and micro tubes according to the Indian design (around 45% cheaper).

Higher quality tubes if handled appropriately can be used for 5 years or longer.

Also the 16mm take off valves are of better quality.

However 16mm laterals of thicker wall thickness are not collapsible for transportation and thus account for a high volume. High volumes increase the transportation costs considerably and therefore these thicker laterals should be sourced and produced in Kyrgyzstan.

INFORMATION ABOUT TRANSPORT COSTS AND CUSTOMS PROCEDURES

Transportation costs

Means of Transport	**Size**	**Shipping cost**	**Remarks**
Railroad	20 feet container (~40 cubic meter)	7'000-7'500 US$	Customs cost not included
Railroad	40 feet container (~80 cubic meter)	14'000 – 15'000 US$	Customs cost not included
Truck	1 cubic meter	150 – 300 US$	Price depends on the weight and volume of the goods Customs cost included

The easiest route for railroad transportation is via Alma Ata to Bishkek. However due to the

customs union between Kazakhstan, Russia and Belorussia the boarder between China and Kazakhstan is currently closed in order to revise and harmonize custom duties between the members. This boarder is however soon to open again.

In the shipping costs by railroad custom costs are not included.

Shipping by truck is somewhat more expensive, but also more flexible, since it allows shipping also small amounts of goods quickly and without much administrational efforts. The place of destiny for the shipped goods in Kyrgyzstan is normally in Kara Suu or in Bishkek where there are free warehouse capacities.

In the shipping costs by truck custom costs are already included.

Transportation from Urumqi to Osh both by railroad and car takes around 12 to 15 days.

Dilschad Dadabaev can organize the ordering of the goods, transportation of the goods from the dealer to the logistics center of Urumqi, verification of quantity and quality of goods, observation of packing for 3% service charges on the FOB price in Urumqi. Packing and packing material used by the dealer is already included in the FOB price.

As a test two rolls with in total 4000m of drip tape have been shipped from Urumqi to Kara Suu. They have in total a weight of around 50kg, a diameter of 47cm and a height of 32cm and 50cm respectively. The total transportation cost including custom costs for this shipment are 22 US$ to be paid on delivery in Kara Suu.

SAMPLE MATERIALS

Various sample materials have been collected and brought to Kyrgyzstan via plane and via truck; they should arrive within the second half of June in Osh:

- Laterals with drippers built in, one roll, 2000m, 700 Yuan, 4900 Com
- Laterals with drippers built in the top, one roll, 2000m, 400 Yuan, 2800 Com
- Various parts necessary to build a drip systems and that are actually available in Urumqi as to June 2011
- (Kushbak will complete this list)

CONTACT LIST

- Dilschad Dadabaev, Director of branch office of “Keletshek” Ltd. in Urumqi
  Tel (Kyrgyz): (00996) 555 090013 / (00996) 772 400013
  Tel (Chinese): (0086) 13109991100

Email: dilshod.0013@rambler.ru

- Farmer Tyshebaev Safar (Chinese Mobile: (0086)18299154342), son of Tyshebaev Ikrom (Kyrgyz Mobile: 0772 11 82 40), Jalalabad farmer who wants to build greenhouses in Jalalabad
- Urumqi "Shifinplast": (Tel: 00991 5620469, 5613688, 00991 5651328, 13629913688, 13899851328, 13899845936), producer of tubes of various diameters and wall thicknesses and simple tee connectors in Urumqi, and dealer of KAREZ Irrigation
- KAREZ Irrigation, XJ Karez Irrigation Technology Co. Ltd., Tel: 0991-4533037, 0991-4545618, Email: karez@xjkarez.com, Webpage: www.xjkarez.com

Kushbak checks and completes (contact details of the shops, shipping company, etc.)

MEETING AND DAY MINUTES

- **6th June:**

Meeting in the Hotel with Dilschad Dadabaev: clarification of goal and tasks of visit in Urumqi and work plan with Dilschad Dadabaev; visit of local bazaar, but not successful in finding Chinese drip systems, clarification with Dilschad about transportation procedure and costs.

- **7th June:**

Visit of orchard and greenhouse farmers 40 km outside of Urumqi with Safar; owner of the greenhouses was not there. Clarification how and what kind of Chinese drip systems they use for orchards and greenhouse. They use flow rate stabilizator drip systems inside the green houses and for the orchards, as well as mini plastic sprinklers for the orchards; collection of examples to bring to Kyrgyzstan;

On the way along the street, visit of government greening and irrigation places where laterals with built in drippers are in use; these systems are used on steep slope; collection of examples to bring to Kyrgyzstan.

Visit of various stores selling various plastic products, including tubes and drip systems; collection of examples to bring to Kyrgyzstan; difficulties to find out prices for whole systems; fixing of meeting with one store to find out about prices.

Visit of a park where low-cost sprinklers are installed.

Government installed drip system with built in drippers on a steep slope

Distribution system from sub main to the laterals with various valves

Government installed mini sprinkler, found allover Urumqi

Orchard plantation around 40km outside of Urumqi, irrigated either by drip or mini sprinklers

Orchard irrigated through a thick 16mm lateral and two flow rate stabilizators

Greenhouses around 40km outside of Urumqi

Drip irrigation inside the greenhouse, 16mm thick laterals and flow rate stabilizators

Sprinklers in a park in the center of Urumqi fully dependent on artificial irrigation

- **8th June:**

Meeting in a store to find out about prices of KAREZ drip system producer, still not clear how much all the parts cost; purchase of one roll of local produced laterals with drip system built in the top, ordering of one roll of drip lateral with drippers built in.

Clarification of conditions for production of the Indian systems in Urumqi; at least one ton of each pieces needs to be ordered in case of injection molding and at least one roll of tubes (around 25kg) in case of tube production. Shifinplast can produce main tubes and laterals as well as 16mm joiners.

All other parts, including micro tubes and 16mm valves they are not able to produce.

See table below for the ex works prices in Urumqi

Main tube , 63mm, 900 micron	1kg = 77 Com = 6m: 12,83 Com/m
Laterals, 16mm, 125 micron	1kg = 105 Com = 160m (+/- 10m): 0,65 Com/m
Micro tubes,	~1.50 Com/m (estimation, price and production possibilities in Urumqi need to be followed up)

- **9th June:**

Working on the report, summarizing what we found out, what we still need to find out and calculation of price examples for 200 square meters and 1 ha orchard

Afternoon: visit of a local market, purchase of various drip parts, different shops were visited for tubes, PVC and PP and PE parts, comparison of different prices.

- **10th June:**

Visit of dealer of Shifinplast. Collection of two rolls of drip tape of 2000m; clarification of some prices which were not clear yet, Clarification of production price for micro tubes (1m = 1,5 Com), flow rate stabilizators and 16mm valves.

Drive to logistics hub in Urumqi to send the two rolls to Osh. Cost clarification about transportation and contracting the shipping of the two rolls to Kara Suu.

- **11th June:**

Working on the report.

CONCLUSION

All the parts as well as whole systems of various drip technologies can be found in China.

Moreover knowledge and experience about drip technology specifically and artificial irrigation in general around Urumqi is high since the city and its surroundings fully depend on it.

Compared to sourcing low-cost drip technology in India, sourcing in China will reduce the final price for the farmers in Kyrgyzstan considerably, between 20 to 45%.

Furthermore the identified parts seem to be of higher quality or represent a more sophisticated kind of drip technology than the Indian low-cost systems using micro tubes.

It is therefore suggested to start sourcing drip technology parts and whole systems in China as soon as need arises.

The two rolls with different Chinese drip tape for vegetable production that are to arrive in Kara Suu by the second half of June should be sold ant tested under Kyrgyz condition still in 2011.

Further, demonstrations about the differences of various drip tapes should be conducted for interested people in 2011 as well.

Only in this way results about the quality and overall performance of various systems will be available already by the end of 2011.

Regarding the quality problems with16mm take off valves from Indian GEWP, these pieces should be sourced from China as soon as need arises. Chinese take off valves not only seem to be of higher quality, but are also cheaper than Indian.

However parts that can be easily and for a low price found or produced in Kyrgyzstan should not be imported from elsewhere, neither China nor India, but sourced locally in Kyrgyzstan (e.g. metal clamps, PVC glue, Teflon tape, etc.).

Thick 16mm tubes that are not collapsible for transportation are important to be produced or sourced as quickly as possible in Kyrgyzstan, since they constitute a high volume and are thus very expensive to ship from China.

In the beginning transportation should be organized via truck/car which does not necessity high volumes and is very flexible. Once the market for drip in Kyrgyzstan picks up and the shipping volumes become high enough transportation may be switched to railroad via Alma Ata and Bishkek. In this case customs procedures and costs still need to be clarified.

Last but not least as long as ordering volumes are not high, all necessary parts for a drip system may be bought directly in Urumqi and shipped from there to Kyrgyzstan. However since only tubes and equal joiners are produced in Urumqi as soon as ordering volumes increase, sales contracts directly with the Chinese producers in the East of the country should be established, in this way bypassing the middlemen in Urumqi.

Kushbak Abdraimov / Markus Brauchli. Bishkek, June 2011

Appendix VIII: Components of a Drip Irrigation System:

Components of a drip irrigation system

A typical low-cost drip irrigation system consists of the following components (see figure 1)

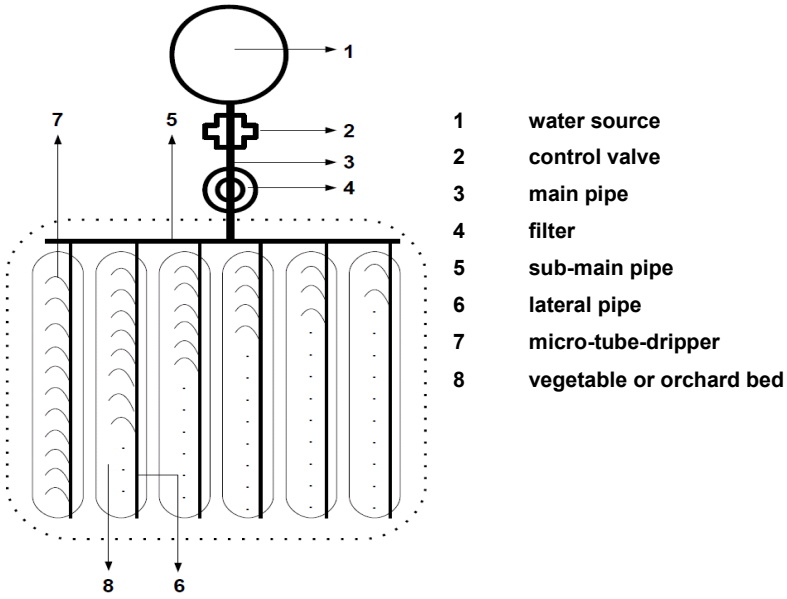


Figure 1: Components of a low-cost drip irrigation system

Since the drip irrigation system is a low-pressure system that uses gravity to increase water pressure, the **water source** has to be an overhead tank or reservoir placed at a minimum of one meter above ground level. Depending on the plot size and the frequency of refilling, the size of the water source should be adapted. Reservoirs can be of various shapes and be made of various materials (metallic or plastic).

Since the reservoir is presently not included in a system, drip irrigation users themselves are responsible to provide an appropriate water source, however it is important that the aperture of the reservoir fits the diameter of the main pipe.

Various reservoirs can be easily found and purchased in Kyrgyzstan, but they increase considerably the final price of a DIS, especially if they are of bigger size. Therefore SEP-IDE should study the market and consider the opportunities of production for low-cost quality water storage means or suggest possibilities for self-made water reservoirs. Famers can for example dig a hole and line it with plastics. Examples and experiences from other countries (e.g. in Central America or India) should be analyzed in this regard

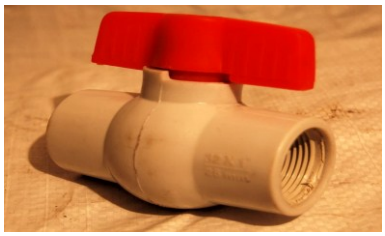
The Indian made **control valves or ball valves** in order to keep down the costs are entirely made of plastics and regulate the required pressure and flow of water into the system. Valves can be of various sizes depending on the size of the whole system. They are either made of PP or PVC and can be produced through injection molding.

Presently in Kyrgyzstan there are no ball valves available that are entirely made out of plastics, but only variations with a metallic ball mostly Turkish made, which are of high quality, but also expensive.

Up to now there has no potential Kyrgyz plastic producer been identified that would be able to produce low-cost ball valves entirely made of plastics. For the presently imported Indian drip systems ball

valves with an inner diameter of either 63mm or 25mm are necessary.

Ball valves only account for around 5% of the total costs of a drip irrigation system.



Picture 1: Indian made 25mm PVC ball valve

Picture 2: Indian made 63mm PVC ball valve

Strainer **filters** ensure that only clean water enters the drip system and thereby the micro tube drippers do not get blocked.

Different types and sizes of filters have been imported from India, providing different flow rates depending on the size of a particular DIS. They may be metallic or made out of plastic, which is cheaper. If made of plastic, they are mostly manufactured through injection molding using PP or PVC.

No research has been conducted so far as to the availability of strainer filters in Kyrgyzstan; however it is assumed that various filters are actually available on local markets.

Up to now there have not been any talks with Kyrgyz plastic producer regarding the possibility of local filter production.

For the Indian drip systems strainer filters with in- and outflow connecters of 63mm or 25 mm diameter are necessary.

Depending on the size of a specific drip irrigation system, strainer filters account for 3-13% of the total costs and therefore following up opportunities for price reductions are certainly worthwhile.

Picture 3: Indian made plastic filter, flow rate 5m3/hour

Picture 4: Indian made metal filter, flow rate 20m3/hour

The **main pipe** and **the sub-main pipe** convey water from the source to the lateral pipes. Filters and ball valves are according to the needs of a plot installed in between.

The size and the diameter of the main and sub-main pipe depend on the size of the whole drip system.

For the Helvetas-IDE drip irrigation systems these pipes using extrusion are made out of PE or PVC, whereby PE pipe material is made from LDPE or LLDPE.

The wall thickness of the pipe is the most important cost factor.

PE pipes can be manufactured in Kyrgyzstan either in Bishkek or Jalalabad by various producers without big efforts, e.g. by Saypitdin, Bahram, Alim or Bülent.

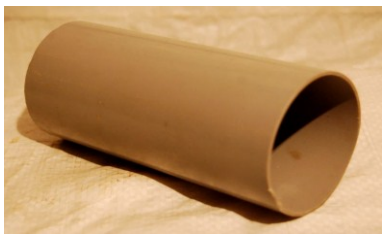
As far as this research has shown no PVC pipes are presently being produced in Kyrgyzstan and they are mostly imported from China or Turkey.

For the presently imported Indian drip systems PE pipes with an inner diameter of 63mm and a wall thickness of 900microns and PVC pipes with an inner diameter of 59mm and a wall thickness of 2mm are used.

Depending on the size and plot conditions (e.g. the gradient of a plot), main and sub-main pipes of a Helvetas-IDE drip irrigation system account for 20-55% of the total costs, whereupon the bigger the system, the higher the percentage.

Moreover taking into account that these pipes can be manufactured not only easily, but more importantly cheaper in Kyrgyzstan or in China, the possibility of Kyrgyz or Chinese sourcing has to be imperatively followed up. (See also table 4 price comparisons Indian, Kyrgyz or Chinese Production or Appendix V)

Picture 5: Indian made PE-main pipe



Picture 6: Indian made PVC main pipe

Lateral pipes are according to the spacing of the plant beds connected to the sub-main pipe at regular intervals, run along the plant beds and are channeling the water to the micro-tubes.

The laterals imported from India have an inner diameter of 16mm and - using extrusion - are made of either LLDPE or LDPE. The wall thickness of the laterals is the most important cost factor. Helvetas-IDE laterals have a wall thickness of 125 to 500microns, but almost exclusively the 250micron variation has been imported to Kyrgyzstan.

Laterals are available either in a plain or in a pre-punched version. Laterals can be produced in Kyrgyzstan by Alim or Bülent, with the thin wall thickness representing the biggest issue.

Depending on the size of a particular DIS and on the spacing of the crops, laterals account for 12-23% of the total costs.

Moreover taking into account that laterals can be manufactured cheaper in Kyrgyzstan or in China the possibility of Kyrgyz or Chinese sourcing has to be imperatively followed up. (See also table 4 price comparison Indian, Kyrgyz or Chinese Production or Appendix V)

Picture 7: Indian LLDPE laterals, 250 micron, and plain, delivered as 1 kg rolls, ~ 80 m

Picture 8: Indian LLDPE laterals, 125 micron, pre-punched

Micro-tube drippers imported from India are straight or curled LLDPE tubes, produced through extrusion with an inner diameter 1mm, a wall thickness of 1mm and a length of 20cm. They are inserted according to plot and crop needs at regular intervals into the laterals.

In order to guarantee equal flow rates the predefined diameter and length have to be absolutely adhered to. The water discharge from the micro-tube is directly proportional to the operating pressure and inversely proportional to its length.

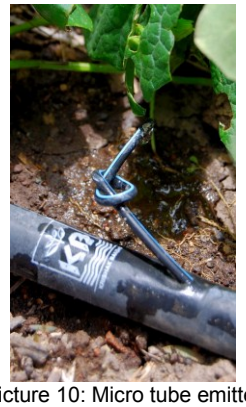
Micro tube drippers are produced using extrusion in the form of an endless tube and have to be cut in the predefined length after the process of production.

Micro tube drippers can be produced in Kyrgyzstan by Bülent or Alim.

Depending on the size of a particular DIS, on the spacing of the crops and how many drippers each crop needs, micro tube emitters account for 0.5-11% of the total costs.

Taking into account that micro tube emitters can be manufactured cheaper in Kyrgyzstan or in China, the possibility of Kyrgyz or Chinese sourcing is certainly worthwhile being followed up. (See also table 4 price comparison Indian, Kyrgyz or Chinese Production or Appendix V)

Picture 9: Micro tube drippers ex stock, 20cm length, 1mm inner diameter



Picture 10: Micro tube emitter with a knob inserted into a lateral

Take off valves are used to connect lateral pipes to the sub main pipes. They are fixed at regular intervals into the wall of the sub main pipe with the help of a rubber grommet (see picture 12). Coming in the form of a valve take off valves allow further regulating the water flow and pressure into the laterals. Since the laterals have an inner diameter of 16mm, the opening of the take off valve leading to the latter have an outer diameter of 16mm accordingly. The opening being connected into the sub main has to fit the grommet diameter (12mm for the Indian DIS). Using injection molding, take off valves of the GEWP DIS are made from PP. Take off valves can be produced in Kyrgyzstan by Alim in Bishkek or possibly also by Salahidin in Jalalabad. Depending on the size of a particular DIS and on the spacing of the crops, take off valves account for 2-12% of the total costs. Taking into account that take off valves can be manufactured cheaper in Kyrgyzstan or in China and there are quality concerns with Indian made take off valves, the possibility of Kyrgyz or Chinese sourcing has to be followed up. (See also table 4 price comparison Indian, Kyrgyz or Chinese Production or Appendix V)

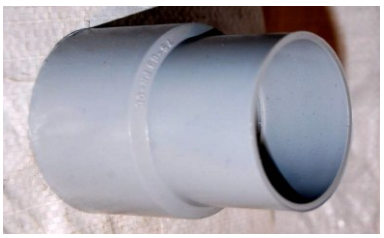
Picture 11: Indian made take off valve made out of PP

Rubber grommets are needed to connect the take off valves with the sub main pipe. Through water pressure the grommet is sealing the connection between the take off valves and the sub main pipe.
For the GEWP DIS they are made for a 16mm diameter opening in the sub main and 12mm opening in the take off valves. No research has so far been conducted regarding the possibility for Kyrgyz or Chinese production of rubber grommets. However in stores selling sanitation material rubber grommets of various sizes are usually available. Depending on the size of a particular DIS and on the spacing of the crops, rubber grommets account for 0.5 - 3% of the total costs.

Picture 12: Indian made rubber grommets ex stock

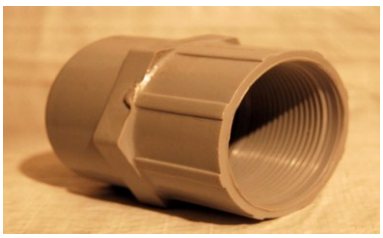
Picture 13: Take off valve fixed to the sub main by a rubber grommet

There are **various other pieces** necessary in order to get a complete DIS. No clarifications have so far been made regarding the availability or local production of these pieces; however they are similar to things needed for sanitary installations and therefore should be easily available on the Kyrgyz or Chinese Market. Below a selection of such pieces is presented.
Straight connecters or **joiners** are required to connect pipes or laterals; they can be equal joiners or reducing joiners. Using injection molding these are made out of either PP or PVC.



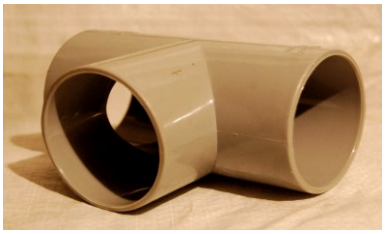
Picture 15: PVC reducing joiner without winding

Picture 14: PP equal joiner to connect laterals



Picture 16: PVC equal joiner with winding

Tee connectors of various sizes are required for instance to connect a branch to the main pipe, main pipe to sub main pipes, lateral pipes to sub-main pipes, etc. The tee connectors can be equal tee or reducing tee connectors. Using injection molding these are made of either PP or PVC.



Picture 17: equal PVC tee connector ex stock

Picture 18: PVC tee connector set in between a filter and valves leading to the sub mains

Elbows of various sizes are necessary to match a DIS to specific plot conditions. Elbows are normally of equal size. Using injection molding they are made of either PP or PVC, but can also be made out of metal.

Picture 19: tied PVC elbow in the field

Picture 20: PVC ellbow ex stock

Flush valves or end caps are necessary to release water at the end of the sub main for instance if dirt has entered a DIS or the water pressure is too high. Depending on the diameter of the sub main, flush valves have an according diameter. Using injection molding they are made of either PP of PVC.

Picture 21: tied PVC flush valve in the field

Picture 22: PP end cap ex stock

Appendix IX: Contact List

Contact Information

Not For Profit Institutions and Cooperatives

Institution Name and address	Contact Person	Tel numbers	Email
Общественный Фонд «Центр обучения, концультации и инновации» (ZOKI) www.taic.kg	КАРАСАРТОВ Шайыбек Тентимишович (Director)	Tel: +996 (312) 365569	director@taic.kg
Общественный Фонд «Центр обучения, концультации и инновации» (ZOKI) www.taic.kg	ЖООШОВ Паязидин Мусаевич (Irrigation Specialist)	Tel: +996 (312) 365566	irrigation@taic.kg
АГРО Консаалтинг Association of Agricultural Service Providers, 723500, The Kyrgyz Republic, Osh city, Lenin street, 428, 3rd floor (Oblopotrebsoyouz building)	Abdiraimov Taalaibek (Executive Manager)	Tel: +996 (3222) 2 85 00, 0(772) 648492	agroconsulting_osh@mail.ru
Общественное Объединение «Agro Foundation for Development“, г. Ош, пр. Масалиева 73 (Organization with cooperatives in the whole of South of Kyrgyzstan (Batken, Osh, Dschalala-Bat) interested in trying drip for potato production	Полтавцев Александр (Председатель)	Тел: (03222) 5 59 52 факс: (03222) 5 59 23	
Ай-КӨК Кооперативи (one of the Cooperatives of Agro Foundation for Development“ Баткен Област 715213, Айдаркен Шаарчасы, Кыргыстан Кеч. Но 19	Тойчиев Абдиламит Саматович (Преседатель) Drip Irrigation User and importer (Chinese) Мадымаров Нурболот	Моб: +996 778 15 39 88 Моб: 0773 299808	madymarov@rambler.ru
Союз кооперативов Кыргызстана «Мол Тушум», http://batken.agroinfo.kg/ru/business-info/associations/129-soyuz-kooperativov	г.Бишкек: Иманбетова Айнура (менеджер) г.Баткен: Абдрашит Халмурзаев г.Жалалабат: Абдуллаева Манзура (Базар-Коргон) Абылкасымов Аскаралы (Ноокен) г.Ош: Бориев Исламбек (Кара-Суу)	тел. +996 (0577) 2022-57 тел. +996 (0312) 4613-65 тел. +996 (03622) 50-561, 60-566 сот.тел.+999 (0777) 068-379 тел. +996 (0773) 1813-04 тел. +996 (0543) 1874-27 тел. +996 (773) 0800-40	Email: abdirashit@mail.ru

Wholesalers

Institution Name	Contact Person	Tel numbers	Email
ОсОО Сиглс Интернейшнл Группа Компанний «АК Чардак», г. Бишкек, ул. Манасчы Сагынбая, 226	Dabke Kedap (Директор) Данiярова Амана	Тел.: +996 (555) 788117 тел:+996 312 45 68 98 Mob: +996 312 772 5586 08	akchardak@yahoo.com seagulls_int@yahoo.com, akchardak_market@mail.ru
Agroline Ltd.	Насыров Эмил Чыныбек Мамытов	Тел: 03222 20761, факс: 0777 505440 раб.тел: (03222) 57343, 0543056925 0772 52 32 32	agroline_09@mail.ru, agroline.kg@gmail.com mchynybek@mail.ru
Общественный Фонд «Центр обучения, концультации и инновации» (ZOKI) www.taic.kg	КАРАСАРТОВ Шайыбек Тентимишович (Director)	Tel: +996 (312) 365569	director@taic.kg
Общественный Фонд «Центр обучения, концультации и инновации» (ZOKI) www.taic.kg	ЖООШОВ Паязидин Мусаевич (Irrigation Specialist)	Tel: +996 (312) 365566	irrigation@taic.kg

Retailers Osh

Institution Name	Contact Person	Tel numbers
ОсОО «Пестициды», Кыргызская Республика, Ошская Область, Кара-Суйский район, с/о Ак-таш, с. Жылкельди	Намашамова Айнура Жумапазаровна (Менеджер по продажам), possible retailer in the future	Тел. +996 (3232) 6 00 16 моб. +996 (551) 11-32-78, +996 (772) 83 33 27
ОсОО «АГРОЗООВЕТСЕРВИС», г. Ош, ул. Джамбула 3	Kymbat	Тел: +996 (3222) 5 13 75 0777 53 99 44 факс: +996 (3222) 2 14 25
Ошская Сельская Консультационая Служба	Исмаилов Артур (Председатель) Хамид (Конзултант)	0550 232224 0773 00 88 70

Retailers Jalalabad

Institution Name	Contact Person	Tel numbers
Агромагазин «Мир Семян», г. Джалал-Абад, с. Сузак центр	Sabir Chusak - Already uses drip irrigation for private purposes (Eurodrip) and is interested in becoming a retailer	0555 881112, 0552 112112 0559 26 60 91

Retailers Batken

Institution Name	Contact Person	Tel numbers
Agro-shop in the Center of town, (possible retailer for the future, see also Cooperative Mol Tushum)	Халмурзаев Абдирашит Назирбекович (Президент)	Тел. 0777 06 83 79 Email: abdirashit@mail.ru

Retailers Northern Regions

Institution Name	Contact Person	Tel numbers	Email
Branch of Agrimatco Ltd in Kyrgyz Republic, Alma-Atinskaya str., 43 Alamudun village, Chuy region, Kyrgyz Republic, 724301	Galina Tashieva (Director)	Tel.+996312 (60-99-79) tel/fax +996312 (60-41-82)	
Public Union AgroLead	Gulnaz Kaseeva (Director) Elena Chigibaeva (Commercial Department)	Tel: +996 312 660818 Mob: +996 552 707035 Tel: +996 312 660818 Mob: +996 555 921152	Email: gkaseeva@agrolead.org Email: e.chigibaeva@gmail.com, echigibaeva@agrolead.org
Сарыбоев Асейин Жумаевич Сын: Сарыбаев Атай Асейимович	Оптовый торговец с связей с Кйтай и Турцией	0552 100 753 055 16 90 53 (секретар Батыщ) 0779 27 94 06 дом. 039 225 14 52	

Plastic Producers

Institution Name and address	Contact Person	Position	Tel numbers
Plastic Extrusion Plant, Jalalabad, outside of Jalalabad	Saypitdin	Director	Mobile: 0772 573 524 Tel: 03722 6 05 18
Plastic Extrusion Plant, Jalalabad	Bahram	Director	Mobile: 0555 65 78 00
Injection Molding Plant, Jalalabad	Salahidin	Chief engineer	Mobile: 077 85 44 552
Turbion Extrusion machinery production and injection moulding forms	Valery Kutimov	General Director	Tel: 91 61 78, 91 64 79, 91 64 77 Mobile: 0775 58 42 62
Plastic injection moulding and extrusion plant, Bishkek	Alim	Director	Mobile: 0772 54 23 34

Plastic Raw Material Wholesaler, Bishkek	Raim	Director	Mobile: 0545 95 22 04 Tel: 61 66 66, 35 20 17
Suat, Extrusion plant and importation of Turkish drip systems, Bishkek	Mustafa	Director	Mobile: 0550 462 966
Extrusion plant a little outside from Bishkek	Bülent, Mehmet	Director, Assistant	Bülent, Mobile: 077 25 26 919 Mehmet, Mobile: 0772 51 82 75
CELEBI group, PVC Production planned, importation of Turkish and Chinese PVC tubes, Bishkek			Mobile: 0555 32 09 82 Tel. (312) 68 18 61

Partners in Tadzhikistan

Institution Name and address	**Contact Person**	**Position**	**Tel numbers**	**Email**
ОО Саодат, г. Худжанд, Таджикистан	Абдухаликов Хасан	Young economist and farmer	+992 92 774 76 56	Email: hasan19021978@mail.ru
Агромагазин «ФАВС», остановка «Куш»	Толибов Мухсин	Farmer and agroshop owner	+992 918 20 21 82	Email: tolibov-agro@bk.ru
	Самиев Махмадамин, Согдийская обл., Джаббор Расуловский район, поселок Дусти (МРМ)		тел: + 992 92 73 70 052	
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G) DECLARATION OF AUTHORSHIP

„I hereby declare,

- *that I have written this thesis without any help from others and without the use of documents and aids other than those stated above,*
- *that I have mentioned all used sources and that I have cited them correctly according to established academic citation rules."*

Winterthur, 3. November 2011

Markus Brauchli