MASTER'S THESIS

CHARACTERIZING POOR SMALLHOLDER FARMERS IN NICARAGUA:

FACTORS INFLUENCING THE SUCCESS OR FAILURE OF MICRO-IRRIGATION USERS

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May 21, 2012

ABSTRACT

This Master's thesis will shed light on the paradox that rural poverty levels in Nicaragua remain as high as 68%[1] despite relatively good access to land. Among the reasons is the chronically low productivity of agricultural producers, which is the result of several factors such as little know-how, lacking technical assistance and low access to credit. Other reasons include the falling agricultural labor demand and the persistently low wages in the agricultural sector, both of which negatively affect the income of rural families.

Furthermore, the thesis investigates who the main protagonists in the countryside, namely smallholder farmers, are. The characterization goes beyond the definition by land size in order to understand under what conditions different types of smallholder farmers live. The findings confirm that smallholder farmers are a heterogeneous group, whose socioeconomic situation varies according to their geographic location and production system and that they do not have the same initial position regarding several variables that influence their success as a producer.

Going a step further, the thesis also dedicates an important part to the aspirations of Nicaraguan smallholder farmers in order to get a deeper understanding of the main target group of most development actors. The finding of the research is that many poor smallholder farmers have difficulties expressing their aspirations, projecting themselves into the future and naming possible options of achieving their aspirations. This confirms that there is a capacity to aspire, which is determined by their social environment and that the poor have less chances of developing and practicing this capacity. Nonetheless, several themes of aspirations could be identified. The most frequently mentioned were related to education, farming, living standard, small business, their community and paying off debt.

In the case study, the objective characteristics and the more subjective aspects of aspirations and perceptions were applied to the use of micro-irrigation systems in order to identify factors inducing success or failure. The thesis presents a circle of success for agricultural producers, in which the micro-irrigation system is just one of the links, and presents potential barriers which might keep people from successfully adopting drip irrigation technology.

In light of the findings, this thesis suggests introducing micro-irrigation to subsistence farmers via the NGOs model and to take the social enterprise approach to reach commercializing smallholders. Further recommendations aim at increasing the success rate of social projects by addressing the needs of the poor and introducing a better selection process.

[1] World Bank, 2008, p.2

ACKNOWLEDGEMENTS

First of all, I would like to express my gratitude to Professor Urs Heierli and to Nadja Kränzlin for giving me the opportunity to come to Nicaragua to do the internship at iDEal Tecnologías and to conduct my research on the ground. The latter would not have been possible without the cooperation of the technical team who drove through the entire country with me to interview smallholder farmers. So a big thanks goes out to Justo, Erika, Panfilo and Eduardo!

Moreover, I would like to thank Alma Lizagarra, Stu Taylor and Francisco Zamora who provided me with fundamental advice and inspiration during the preparation of my research activities. During and after the data collection phase, the interviewed experts gave me valuable input by sharing their experiences and knowledge.

Throughout my entire stay in Nicaragua, I had the moral support of my family and friends, who helped to remain optimistic even during the occasional moments of chaos and frustration. I furthermore thank them for their time and feed-back on my thesis. As external people, they gave me important inputs of how to present the material so that it becomes accessible for all.

Last but not least, I dedicate this thesis to all smallholder farmers in Nicaragua, of which I had the pleasure to meet 50. I wish to thank them for allowing me to get a better understanding of their agricultural activities and their complex living conditions. I was impressed by their openness to share personal experiences and their aspirations with me.

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1. INTRODUCTION

"Eight hundred million of the 1.1 billion people in the world who earn less than a dollar a day, live in rural areas in developing countries and earn their living from farming."[2] It is therefore crucial to understand who the protagonists in the countryside - namely small farmers - are, what their socio-economic situation is and what potential they have to overcome poverty.

After decades of research, the concept of poverty is still an object of discussion. Although a consensus has emerged that poverty is complex and multidimensional, defining poverty remains a challenge. This is all the more the case if one takes the regional differences into account. Being poor in India is not the same thing as being poor in Central America. In Nicaragua for instance, agrarian reforms after the 1979 revolution led to important land redistributions in the past. As a result, access to land is not a major issue. On the contrary, 79% of agricultural producers have direct access to land even if it may be on a small scale.[3] It is quite common for a poor farmer to have several hectares of land. However, this does not mean that the Nicaraguan smallholder farmer is not as poor as an outsider might assume, comparing his situation with a poor person in other parts of the world.

For this reason this thesis attempts to shed light on the paradox that for decades rural poverty levels in Nicaragua remain as high as 68%[4] despite relatively good access to land. The thesis will identify the characteristics of small farmers going beyond the definition by land size in order to understand under which conditions different types of small farmers live, thus getting a more complete picture of their socioeconomic situation. This characterization of small farmers will take into account regional differences and several variables that influence their success as a producer. Going a step further, the thesis will also dedicate an important part to the aspirations and perceptions of Nicaraguan small farmers in order to get a deeper and more personal understanding of the main target group of government institutions, local and international non-governmental organizations (NGOs) and social enterprises that intend to improve the livelihood of the rural poor. On the basis of the objective characteristics as well as subjective aspirations and attitudes a case study on micro-irrigation was conducted to investigate which factors lead to the successful use of drip irrigation technology and which barriers kept the small farmers from doing so.

[2] foreword by Paul Polak in Heierli & Katz (2007)
[3] Baumeister, 2009, p.405
[4] World Bank, 2008, p.2

1.1 RESEARCH QUESTION AND RELEVANCE

This thesis intends to answer the following research question:

What are the characteristics, conditions and aspirations of poor small farmers in Nicaragua and how do these influence their success or failure in using micro-irrigation?

This overarching research question gives rise to several subsequent questions, to which the different chapters of this thesis are dedicated:

- How is poverty defined and measured? What does it mean to be poor in rural Nicaragua?
- What are the characteristics of different types of (potential) small-scale producers?
- What are the aspirations, needs and perceptions of smallholder farmers?
- What factors influence the successful use of micro-irrigation systems among smallholder farmers and what barriers exist?
- What are the most effective approaches to introduce micro-irrigation to different types of smallholder farmers?

Regarding the relevance of the research question, it is true that a lot has been written about poverty in Nicaragua in its various dimensions. However, only few sources deal specifically with small-scale farmers although they are among those most affected by poverty as "65% of the poor and 80% of the extreme poor live in rural areas."[5] That is why this thesis puts small-scale farmers at the heart of its research. Its added value lies in the fact that it will create a profile of smallholders by investigating the current situation regarding several variables, which not only affect their livelihood but also their potential to be successful agricultural producers in the future. By including the personal dimension of aspirations and perceptions of smallholder farmers this thesis goes a step further in order to shed light on what factors – both objective and subjective - play a role in determining who uses the micro-irrigation system successfully and sells his or her harvest and who does not, e.g. by stopping its use altogether.

In light of the criticism that development aid is inefficient and ill-focused it is all the more important to know who the main target group is. Having a complete profile on poor smallholder farmers in Nicaragua is useful for development actors like government institutions, NGOs and social enterprises because it can help them promote their products and services better by targeting the areas where the current situation is still unsatisfactory and by addressing clients' needs and aspirations. In addition, by having identified potential drivers and barriers, anybody engaging

[5] World Bank, 2008, p.4

in projects or business with poor smallholder farmers in Nicaragua will have a better idea of who their target group should be and what type of challenges they are likely to face.

1.2 METHODOLOGY AND STRUCTURE

This thesis consists of four main parts, going from the broad to the more specific in order to finally apply the findings to a case study investigating the drivers and barriers to success in micro-irrigation users.

I. Poverty definition and rural poverty in Nicaragua
II. Profile of smallholder farmers
III. Aspirations of smallholder farmers
IV. Application to micro-irrigation: drivers and barriers of drip irrigation users

Before explaining the methodology, it should be mentioned that this thesis is based on the experience gained through an extensive stay in Nicaragua as part of an internship at iDEal Tecnologías[6], a social enterprise selling low cost drip irrigation systems.

For the first big chapter providing the necessary background on poverty in general and rural poverty in Nicaragua in particular (chapter 2), secondary data sources were carefully analyzed, which include relevant literature from books, scientific articles and reports or studies on poverty in Nicaragua.

The theoretical framework of the second big thematic block on smallholder farmers (chapter 3) builds on the two main contributions by the research centers Nitlapán and CIPRES, which define different types of farmers in Nicaragua. For the characterization of small farmers 50 customers of iDEal Tecnologías in nine different *departamentos*[7] were visited in order to collect data on the variables relevant to getting a good sense of their potential to become successful producers and their situation regarding education and access to health. As part of the study on poverty the Progress out of Poverty Index[8] was applied, the modalities of which will be explained in sub-chapter 2.1.2. To ensure the overall quality of the data, the interviews for this part of the research were conducted in the presence of one of the iDEal technicians or by the technicians themselves so as to avoid any bias that might arise from the farmers answering to a foreigner. It can be a fundamental issue that people tend to say what they think the other person wants to hear or to exaggerate or understate their situation. The results were then backed by existing literature on related topics.

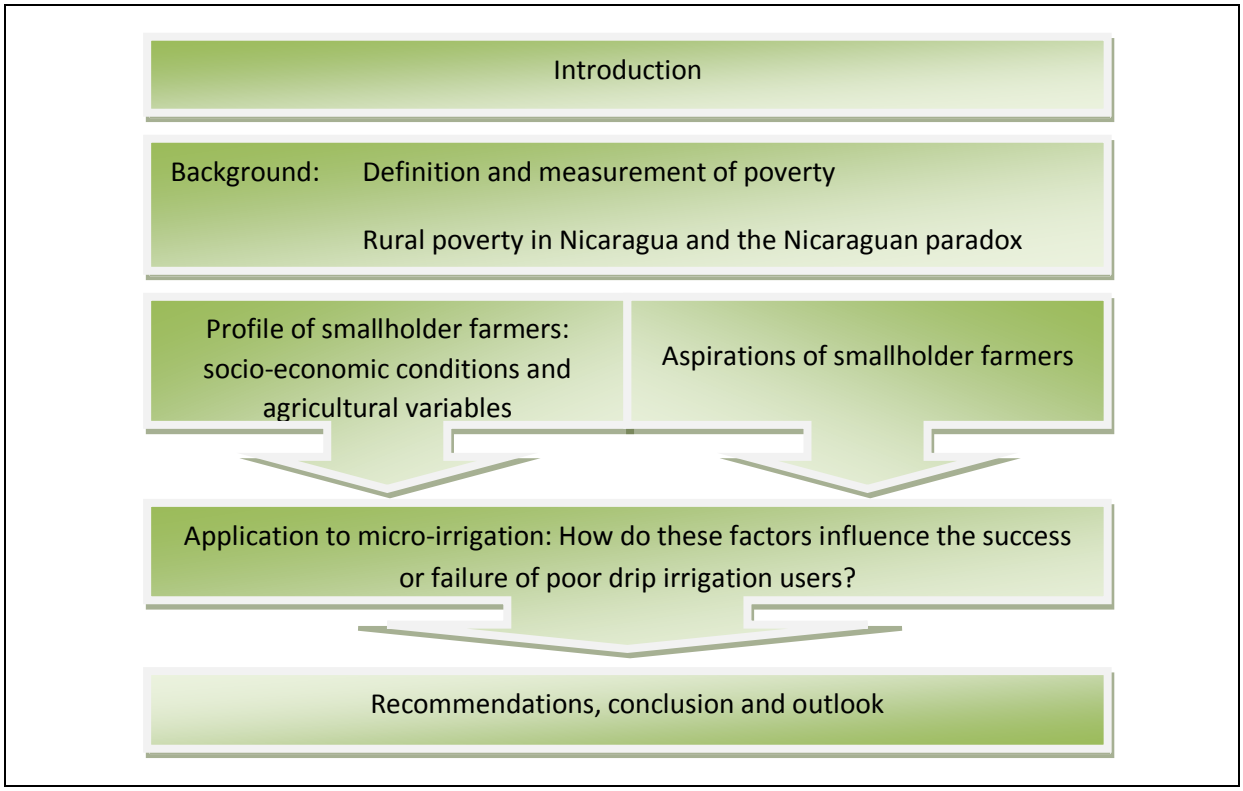
[6] For more detail consult chapter 5.1 or the website of IDEal's mother NGO "International Development Enterprises" (IDE) at www.ideorg.org
[7] Administrative regions
[8] http://progressoutofpoverty.org/

The third and fourth thematic blocks (chapters 4 and 5) made use of the Human Centered Design (HCD) toolkit[9], which provides social enterprises and NGOs with tips for interview guides and tools such as aspiration cards. Ten individual in-depth semi-structured interviews were conducted with iDEal customers who had been visited previously and who left the impression that they had used the drip irrigation system successfully or not. Due to logistical constraints only four unsuccessful micro-irrigation users could be interviewed.

For all chapters corresponding literature was consulted if available. As this was often not the case, especially regarding the aspirations, perceptions and attitudes of small farmers, expert interviews became fundamental in order to back up the findings and to make sure the results of this research were interpreted correctly.

Figure 1 illustrates the structure of this thesis.

Figure 1: Structure of the Master Thesis



Source: own illustration

[9] www.ideo.com/work/human-centered-design-toolkit/

2. POVERTY IN NICARAGUA

2.1 HOW TO DEFINE AND MEASURE POVERTY

2.1.1 OVERVIEW OF DIFFERENT APPROACHES TO DEFINE AND MEASURE POVERTY

The first question to be asked when discussing poverty is how to determine who is poor.[10] In order to identify the poor, several concepts of poverty exist, which give priority to different dimensions of poverty. According to the chosen focus, the measurement of poverty varies too although one has to keep in mind that some aspects of poverty are difficult to quantify and measure. Despite the growing consensus that poverty is multidimensional, the debate among academics and practitioners is still ongoing and this thesis neither attempts to discuss the entire history of poverty definitions nor will it judge which measurement is most appropriate. It is nonetheless crucial to understand that different approaches exist, which in turn have implications for determining who is considered poor. Therefore, a brief overview of poverty definitions and measurements will be given in this section.

Economic well-being

The earliest and most widely used dimension of poverty definition and measurement is economic well-being. Economists traditionally consider poverty as material deprivation and thus try to define poverty in quantifiable ways using income, consumption and welfare. This approach is based on the idea that there are basic means of survival and thus poverty would mean being deprived of these minimum requirements. Not surprisingly, there are disagreements about what is essential for survival and whether or how certain non-materialistic needs of social, psychological or political nature are to be taken into account given that they cannot be appointed a monetary value.[11] Although this critique makes an important point, there are reasons in favor of focusing on poverty as material deprivation. Morduch (2006) argues that this approach is practical because "inadequate income is clear, measurable, and of immediate concern for individuals."[12] Furthermore, he explains that insufficient income correlates strongly with other important concerns that are difficult to measure. For example, those most vulnerable to health issues and with the lowest social status tend to come from the bottom of the income distribution.[13]

These arguments might explain why it has become normal in developing countries to define poverty through the establishment of a poverty line. The latter reflects the "amount of income

[10] Streeten, 1998, p.41
[11] Wagle, 2002, p.156
[12] Morduch, 2006, p.29
[13] Morduch, 2006, p.29

required to acquire a minimum food calorie intake or a minimum basket of consumption goods […] needed to live a basic life."[14] So a person is considered poor if his/her income or expenditure is below this cutoff line. It is not identical to measure income levels or spending patterns because households also borrow, sell assets or draw on savings when their income is low.[15] Due to this consumption smoothing, consumption expenditure is more stable than income and so many experts consider it to be a better indicator of poverty. Furthermore, Streeten (1998), for example, points out that "it has the added practical advantage of often being more easily gathered than income data, which can be quite uncertain for owner-operated farms or firms for which no books are kept and for which the concept of net profits is vague."[16] A final argument in favor of consumption-based measurements is that especially agricultural households produce a large portion of their consumption themselves, which is not captured in income data.[17]

In developing countries the most common poverty thresholds are absolute ones, as opposed to relative ones.[18] Usually two absolute poverty thresholds are defined to distinguish the non-poor from the poor and within the poor, the extremely poor. A person who is unable to acquire the consumption basket of basic goods is considered poor and an individual who cannot even assure the minimum calorie intake is considered extremely poor.[19] The World Bank, for example, follows the absolute consumption-based approach by defining the extreme and general poverty lines for developing countries as $1.25 and $2.50 per day respectively in dollars adjusted for purchasing power parity (PPP).[20] Using an international poverty line allows to measure global progress but national poverty lines are more appropriate for analysis and comparisons within a country (i.e. because eating and living patterns vary from country to country).[21] In either case, one has to be aware that there is a difference between the concept and reality. Obviously, the actual difference in living conditions between people just below the poverty line and others barely above it will hardly be noticeable although the former would be considered poor while the latter would not. The purpose of poverty measures based on poverty lines is to enable analysts to describe a situation and to monitor changes against a clear benchmark.[22]

The economic well-being approach to poverty suggests that poverty is effectively reduced by increasing income or consumption capacities of the poor. However, while material deprivation is

[14] Wagle, 2002, p.156
[15] Morduch, 2006, p.30
[16] Streeten, 1998, p.42
[17] Demombynes, 2008, p.11
[18] Relative thresholds are more relevant in affluent societies, where the poor are identified as those who earn significantly less than the average person (Hagenaars, 1988, p.214)
[19] Spalding, 2009, p.359
[20] Kanbur & Lustig, 2001, see Box 1.2
[21] Morduch, 2006, p.43
[22] Morduch, 2006, p.31

an important component of poverty it ignores that a person's well-being depends on quality of life as well, which cannot be reduced to economic well-being.[23]

Poverty as lack of capabilities

For decades, poverty researchers have argued that the notion of economic welfare is too narrow to reflect individual well-being and have urged to broaden the concept of poverty by including other dimensions, such as health and education. Sen (1987, 1999) is one of the most prominent advocates of taking a broader approach to development and poverty. He believes that development consists in the increase of individual freedoms, which is reflected in the ability to freely choose between "alternative functioning combinations."[24] These concrete capabilities enable humans to develop strategies to sustain the life forms they themselves value. From this perspective, poverty is understood as lack of these capabilities, which undermines the rights of the poor to determine their access to resources, their opportunities to convert these resources into other types of valuable goods and services, and the possibilities to participate in relevant social processes.[25] For example, a program for rural education of adults increases the potential of the participants to get better paid jobs. However, if they do not have good roads or transportation they are not able to actually make the best of these new opportunities in neighboring towns or cities.[26]

As opposed to the economic well-being approach, the capabilities approach rejects the idea that having enough income or opulence in itself guarantees improved living conditions. Indeed, Muellberger (1987) stresses that the capability approach puts "weight on anthropometric measurement of physique and on health and morbidity, skills, educational levels and housing conditions."[27] Furthermore, Sen (1999) argues that while many of these achievements that reflect one's well-being are difficult if not impossible to measure, poverty indices have been developed that take more dimensions into account.

The Unsatisfied Basic Needs Index, for instance, has been particularly popular in Latin America since the 1980s. Its indicators include the type of housing, access to water and sanitation, crowding (e.g. the number of people living in a same bedroom), education and economic dependency.[28] If one basic need is not met, the household is considered poor and if two or more basic needs are not met the household is considered extremely poor. Whereas the poverty line is a

[23] Wagle, 2002, p.158
[24] Sen, 1999, p.79
[25] Clark, 2005, p.8
[26] Rello, 2001, p.13
[27] Muellbauer, 1987, p.37
[28] Hammill, 2009, p.26

cyclical indicator, the Unsatisfied Basic Needs Index is fundamentally structural because the included variables are prone to change very slowly over time. The World Bank rejected the Unsatisfied Basic Needs Index because no consensus could be reached on which elements constitute basic needs and because this definition depends on prior governmental investments into services and infrastructure.[29]

Another example for an index that measures poverty beyond monetary terms is the United Nations' Human Development Index (HDI), which was inspired by Sen's capabilities approach. It adds the dimensions of health and education to that of income in order to determine a country's level of development. The more developed a country is, the closer its HDI will approach the value 1. In the 2011 Human Development Report, Norway takes up the top spot with an HDI of 0.943, whereas the Democratic Republic of Congo is at the very bottom of the ranking having a HDI of only 0.286.[30]

The Multidimensional Poverty Index (MPI) is one of the more recent indices that take a multi-dimensional approach to poverty, according to which poverty is regarded as capability deprivation.[31] In order to determine who is poor and who is not, Bourguignon and Chakravarty (2003) contend that "a multidimensional approach to poverty defines poverty as a shortfall from a threshold on each dimension of an individual's well-being".[32] This involves the notion of poverty lines, whereby the individuals below a poverty line are identified as poor. In the multi-dimensional case, however, two cutoffs must be considered for identification. In 2008 Alkire and Foster proposed a new class of multidimensional poverty measures based on the FGT (Foster, Greer and Thorbecke, 1984) class of unidimensional poverty meaures. First, for each dimension, a dimension-specific poverty line identifies the individuals deprived in that particular dimension. The second cutoff determines the number of dimensions, k, in which one must be deprived before they are considered multidimensionally poor.[33]

All in all, the capability poverty approach successfully incorporates individual factors into poverty definition and measurement but by doing so it might actually neglect the important roles social orders and relationships play. Institutional mechanisms are equally important since they can create obstacles or offer opportunities in transforming capability into human well-being.

[29] Spalding, 2009, p.359
[30] http://hdr.undp.org/en/statistics/
[31] Alkire & Foster, 2011, p.480
[32] Bourguignon & Chakravarty, 2003, p.25
[33] Bennett & Mitra, 2011, p.1

Social exclusion

The last major dimension of poverty definition and measurement is social exclusion. According to this approach somebody "with adequate income and adequate capability to produce certain functioning may still be poor, if, for example, s/he is excluded from the mainstream economic, political, and civic and cultural activities that are embedded in the very notion of human well-being."[34] Social exclusion affects poverty by virtue of several different dimensions.

First of all, explicit or implicit discrimination based on race, gender or location can have an economical impact by denying some individuals access to some activities, such as entering the formal economy. Secondly, the poor are often disproportionally affected by formal or informal barriers that keep them from political participation.[35] In the case of Nicaragua the poor might very well be encouraged to vote but as they tend to be instrumentalized by the current president Daniel Ortega rather than being given a real voice or a chance to influence the decision-making process, the social exclusion argument still applies. Last but not least, social exclusion occurs when individuals are hindered from participating in civic associations, membership organizations, social networks etc. This has a negative impact on well-being because social belonging plays an important role in increasing social capital.[36] Given the high degree of participation in associations and co-operatives specifically addressing smallholder farmers, for example, this last argument applies less to the situation in Nicaragua.

After giving an overview of these three concepts of poverty, Wagle (2002) argues that "while all three approaches – economic well-being, capability, and social exclusion - are relevant to define, measure, and explain poverty, their meaningful integration is yet to take place."[37] It has to be acknowledged however, that over the past few decades poverty has been increasingly viewed as multidimensional, encompassing not only material deprivation (i.e. income and consumption) but also deprivation related to health and education. Since 2001, the World Bank further recognized an even broader conceptualization of poverty that includes more psychological aspects of the poor. Among these are experiences of lack of voiceless and powerlessness, feelings of vulnerability and prior risk exposure and the subjective experiences of ill-being and well-being.[38] The latter can be measured using a combination of participatory methods, some of which were used during the research of this thesis. Indeed, the ultimate goal when assessing poverty is to seek compromises by integrating qualitative and quantitative indicators into the

[34] Wagle, 2002, p.160
[35] Verba et al., 1993, p.312
[36] Haan, 1998, p.15
[37] Wagle, 2002, p.162
[38] Chakravarti, 2006, p.365

analysis. The question to be answered is how to capture important elements of poverty in transparent and practical ways.

2.1.2 PRIORITIZING PRACTICALITY AND ADEQUATE USE: PROGRESS OUT OF POVERTY INDEX

As was shown in the previous section, there are numerous ways to define and measure poverty. When it comes to its practicality, however, several of the approaches are difficult to apply in practice. Going beyond the theoretical debate and the application at the country level, it should be noted that institutions such as NGOs and social enterprises working in the development field need a tool, which provides accurate estimations and is simple enough to include it in daily business procedures. Indeed, the main challenge of scorecard design is "not to squeeze out the last drops of accuracy but rather to improve the chances that scoring is actually used."[39]

One of the tasks during the author's internship at IDE/iDEal Tecnologías was to select an appropriate poverty index, which goes beyond estimated income to determine the socio-economic situation of customers. The selected index would then be integrated into iDEal Tecnologías' monitoring and evaluation system. After comparing the advantages and disadvantages of the Multidimensional Poverty Index[40] (MPI) and the Progress out of Poverty Index[41] (PPI) in light of four criteria - applicability, accuracy, simplicity and current popularity - the PPI was chosen. Although both poverty indices are of high quality and improve on past poverty measurement tools, the PPI fulfills more of the selection criteria for IDE's monitoring and evaluation needs. Its unit of analysis is the household, it is very simple and can be implemented immediately, the indicators are sensitive to changes in the poverty status and numerous institutions are already implementing it. The MPI, on the other hand, has so far only been used on a national and international level and would therefore not only need to be adapted to the organization level but also to the local context. Despite the fact that an important dimension, health, is not included in the PPI, the indicators proposed in the MPI require data that might be difficult to obtain in some instances.

The complete comparative report can be consulted in Annex 3. At this point only a brief explanation of the PPI will be given, which is necessary because the index was used during the field visits to determine the customers' probability to fall below the poverty line.[42]

[39] Grameen Foundation, 2008, p.3
[40] http://www.ophi.org.uk/policy/multidimensional-poverty-index
[41] http://progressoutofpoverty.org/
[42] For the purposes of this thesis the national poverty line was taken as a reference.

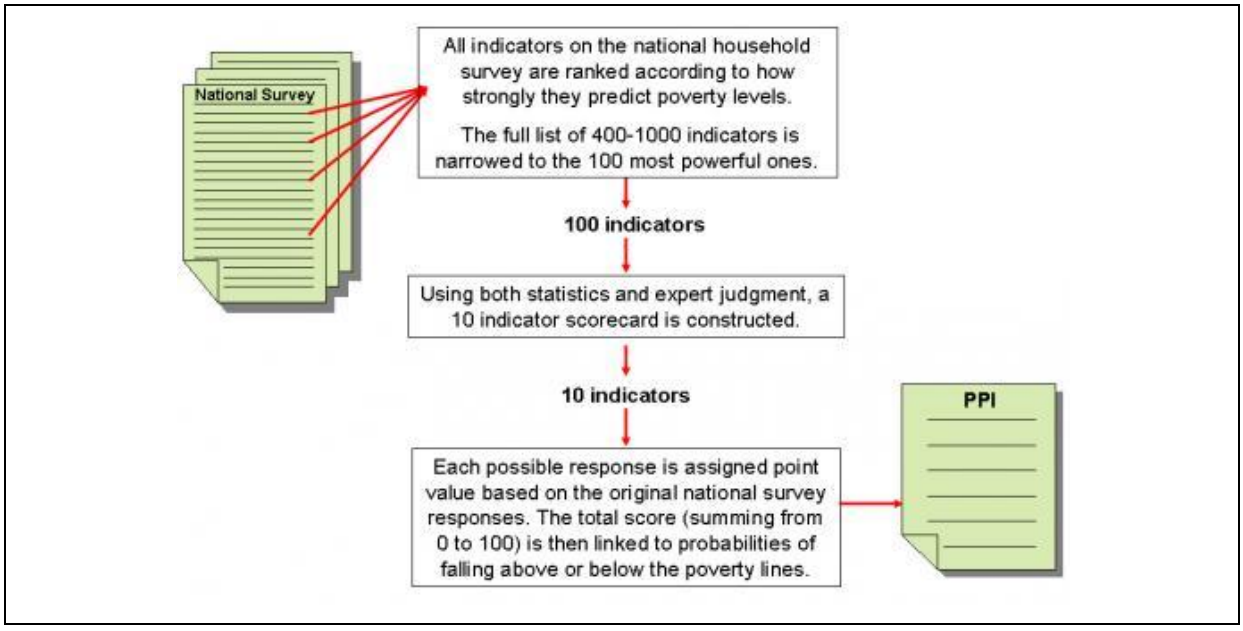
The way in which the PPI works is as follows: The index consists of 10 indicators with an individual response for each that is assigned a value. The sum of the scores for all indicators is the PPI score for that household. The PPI score is associated with a poverty likelihood that reflects the probability that the household falls into certain poverty bands. So "a PPI score is *not* poverty likelihood; it is *associated* with poverty likelihood. Low PPI scores (for instance, 1-24) are associated with high poverty likelihoods while high PPI scores (for instance, 75-100) are associated with low poverty likelihoods."[43]

Regarding the choice of indicators, the country-specific scorecard is the result of extensive testing. The indicators in the PPI are derived from the most recent country-specific national level surveys of expenditure or income. These indicators are classified into the following categories:

- Household and housing characteristics (such as cooking fuel and type of floor)
- Individual characteristics (such as age and grade level)
- Household durable goods (such as electric irons and radios)

Figure 2 shows the construction process of the PPI.

Figure 2: Construction of the PPI



Source: Process out of Poverty Index Overview

This final index, the PPI scorecard, then serves as a baseline from which client progress is measured for that country.[44]

[43] Grameen Foundation, 2008, p.47
[44] Grameen Foundation, 2008, p.7

2.2 ASSESSMENT OF RURAL POVERTY IN NICARAGUA

Now that the necessary background on different approaches to define and measure poverty in general have been provided, this next subchapter will focus on the situation in Nicaragua, and in particular on the rural poor. Before analyzing the evolution of (rural) poverty in Nicaragua over the last two decades, the rural population needs to be identified.

2.2.1 DEFINING THE RURAL POPULATION

According to the Nicaraguan census authority INIDE[45] a town is considered "urban" if it has a population of 1,000 inhabitants or more, who have access to certain services such as streets, electric light, commercial and/or industrial establishments etc. Rural areas are defined as those towns with less than 1,000 inhabitants and which do not have the minimal urbanistic conditions and whose population is dispersed.[46]

Using the data of the VIII Population Census and the IV Household Census of 2005, 44.1% of the Nicaraguan population lives in rural areas. If one considers international parameters that distinguish the urban from the rural through a threshold of 20,000 inhabitants the percentage of Nicaraguans living in rural areas increases to 60.5%.[47]

As opposed to other Latin American countries, the agricultural sector represents slightly more than 35% of the total national active population. Within the rural areas, agriculture represents over 70% of total employment.[48] Other activities include small business and private services. However, agriculture is the main motor of these existing businesses and private services. Baumeister & Rocha (2009) point out that the importance of agriculture is especially high if one keeps in mind that a predominant part of employment is based on self-employment and unpaid family members.

2.2.2 RURAL POVERTY IN NICARAGUA

Nicaragua is still considered the second poorest country in the Western hemisphere after Haiti. Even after decades of massive efforts by the national government, international donors and local as well as international NGOs, poverty rates in Nicaragua remain high.

According to data based on the comparison of households' income capacity with the international poverty line, one fifth of the entire population (21%) of the Nicaraguans live on

[45] Instituto Nacional de Información de Desarrollo: www.inide.gob.ni
[46] Baumeister & Rocha, 2009, p.3
[47] Baumeister & Rocha, 2009, p.3
[48] Baumeister & Rocha, 2009, p.5

less than US$2 PPP a day.[49] This partly explains why Nicaragua takes up a rather low spot (129 out of 187 countries) in the ranking of the Human Development Index 2011. With an HDI of 0.589 Nicaragua is below the regional average of 0.731.[50] The low HDI ranking not only reflects a bigger deterioration in living conditions, but also an unequal distribution of diverse socio-economic opportunities.[51] Furthermore, one observes high levels of child malnutrition among less than five-year-olds and general malnourishment, which are both related to prolonged difficulty of a significant proportion of households to subsist and generate income. Indeed, Nicaragua has the lowest income per capita levels in the region.[52] The social indicators related to education, health and access to water and sanitation are also the lowest in Central America. Given these conditions it is likely that Nicaragua will have difficulty achieving half of the Millennium Development Goals by 2015.[53]

The most recent data on poverty levels in Nicaragua are available from two different sources. The official report by INIDE presents the results of the 2009 national household survey[54] (EMNV 2009) contrasting them to the results of the 2005 EMNV. Another study was conducted in 2010 by FIDEG[55], an independent think tank, whose research was partly funded by international donors. Table 1 shows that the results regarding the calculated poverty levels differ. This can be due to differences in methodology, the sample chosen, the way in which the interviews were conducted, etc.

Table 1: General poverty levels in Nicaragua 2009 (in %)

Type of poverty	INIDE	FIDEG
National:	42.5	44.7
Rural:	63.3	67.8
Urban:	26.8	30.2

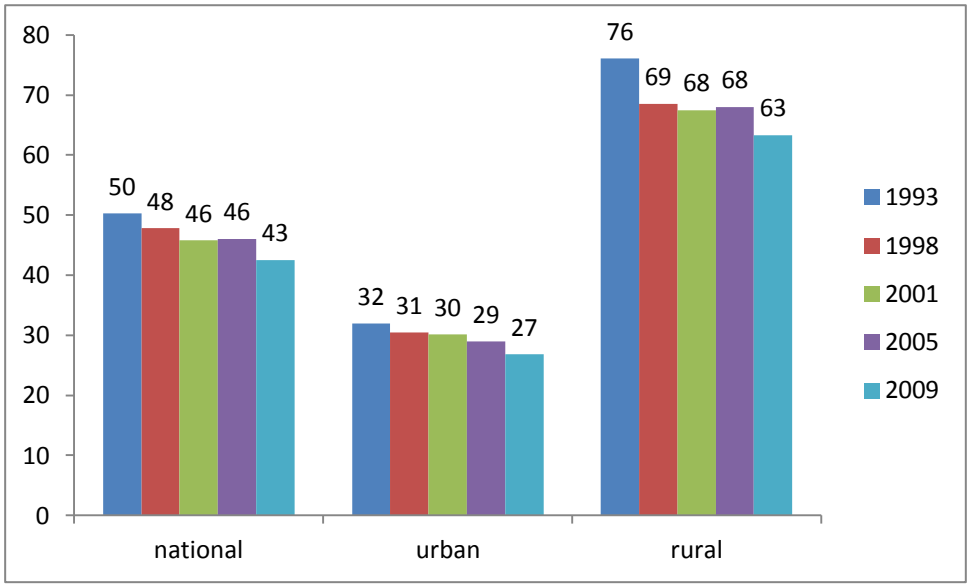
Source: based on INIDE (2011) and FIDEG (2010)

[49] INIDE, 2011, p.15
[50] The HDI of Latin America and the Caribbean as a region increased from 0.582 in 1980 to 0.731 today, placing Nicaragua below the regional average (UNDP, 2011)
[51] http://hdrstats.undp.org/en/countries/profiles/NIC.html (accessed on 24/04/2012)
[52] Baumeister & Rocha, 2009, p.6
[53] See table 3 in Spalding, 2009, p.366
[54] Encuestas de Hogares sobre Medición del Nivel de Vida (EMNV)
[55] Fundación para el Desafío Económico Global: www.fideg.org

Even if the official methodology has been criticized for not adjusting the minimum caloric intake in 2005[56], this thesis will base its analysis on the official survey data because it is the only source providing numbers over a longer period of time. Taking the same source as a reference is necessary to allow comparisons over time and the identification of tendencies.

In Nicaragua the national poverty line defines a person as "poor" if he or she lives on less than $1.56 a day per person and as "extremely poor" if he or she lives on less than $0.92 a day.[57] These thresholds appear lower than the international poverty line by the World Bank, which sets the limits at $2.50 and $1.25 a day per person respectively. This is because the World Bank uses dollars at purchasing power parity (PPP) and the national poverty line current dollars. Taking the national consumption basket as reference, figure 3 shows the evolution of general headcount poverty levels in Nicaragua between 1993 and 2009.

Figure 3: Headcount poverty rates in % by area 1993-2009 (general poverty line)



Source: World Bank analysis of EMNV data (1993-2005), EMNV 2009 (INIDE)

The official data provided by the national household surveys of 1993, 1998, 2001, 2005[58] and 2009 indicate that the percentage of general poverty was 50.3%, 47.9%, 45.8%, 46.2% and 42.5% respectively.[59] If one breaks the national poverty levels up according to where the population lives, it becomes clear that the rural population is significantly more affected by poverty than their fellow countrymen in the urban areas.

[56] Interview with Freddy Ruíz (E4)
[57] INIDE, 2011, p.7
[58] After statistical analysis of the household survey results, the World Bank (2008) revised the numbers of the 2005 EMNV.
[59] INIDE, 2007, p.11

Indeed, the proportion of poor rural inhabitants reached staggering 76.1% in 1993, 68.5% in 1998, 67.5% in 2001 and 67.9% in 2005.[60] So for years there was no decrease in rural poverty levels in Nicaragua. On the contrary, there was even a slight increase between 2001 and 2005, which can be explained by the limited financial resources the government had at its disposal.[61] Not only was poverty reduction not a priority but to make things worse, the state programs that did exist during that period were "a disaster"[62] in terms of bad focusing and inefficiency.[63]

It is only between 2005 and 2009 that rural poverty rates decreased significantly, falling to 63.3% in 2009.[64] There are two main factors that contributed to this reduction:

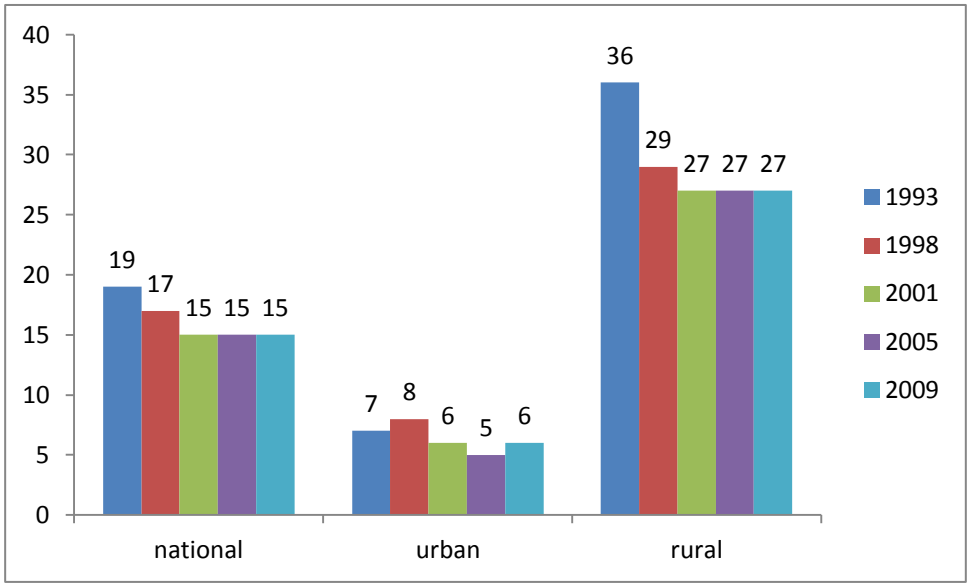
- Since the return to power of Daniel Ortega and the Sandinista party in 2006, public social programs regained importance and many of them were reoriented to focus more on the necessities of the poor. The new focus lies on the provision of basic social services, an extensive program to alleviate malnutrition in rural areas called "Hambre Cero" (Zero Hunger) and the extension of micro-credits.[65]
- The increase of international food prices in recent years benefitted agricultural producers, both big and small. Nicaragua exports basic grains and meat and as will be shown in section 3.2 smallholder farmers contribute largely to the production of foodstuffs.

Despite these positive elements, one has to keep in mind that not everybody benefits from these trends and consequently the situation has not improved for everybody. Indeed one of the pre-requisites to qualify for the state programs is to possess land (e.g. to receive a cow, agricultural input or training).[66] This excludes the landless poor who work as agricultural day labor and are among the most vulnerable. The same goes for the high food commodity prices. Although small-holder farmers also benefit, the real gains are made by large-scale producers and export agri-businesses. As a result of these relativizations, rural poverty has decreased but not significantly.

The fact that especially the most vulnerable have not seen improvements in their situation is reflected in the stagnant levels of extreme poverty. Figure 4 shows that between 1998 and 2009 the proportion of the extremely poor remained stable at around 15% of the population and stag-nated at around 27% in the rural areas.[67]

[60] INIDE, 2007, p.11
[61] Being highly indebted, Nicaragua had to drastically cut spending to meet the conditions of the IMF. (Spalding, 2009, p.365)
[62] Interview with Freddy Ruiz (E4)
[63] Spalding, 2009, p.363
[64] INIDE, 2011, p.13
[65] Spalding, 2009, pp.368-375
[66] Spalding, 2009, p.373
[67] INIDE, 2007 & 2011

Figure 4: Headcount poverty rates in % by area 1993-2009 (extreme poverty line)



Source: World Bank analysis of EMNV data (1993-2005), EMNV 2009 (INIDE)

As was the case with the general poverty rates, extreme poverty is also largely a rural phenomenon in the sense that 78% of the inhabitants living under such conditions reside outside urban areas.[68] In 2009 for example, 63.3% of the rural population was poor, of which 26.6% were extremely poor (see figure 4). This means that 27% of the rural population was in a situation of extreme poverty, 37% were poor but not extremely poor and 37% were not poor.[69]

Breaking up the numbers according to geographical location, table 2 shows that extreme poverty has a high incidence in the typically rural regions such as the Center and the Atlantic Coast. For example, in the rural part of the Central region (which extends from the north to south of the country and is home to coffee production and livestock farming) 29% of the total population is extremely poor.[70]

Table 2: Rural poverty levels in Nicaragua 2009 by region

Region (rural)	General poverty	Extreme poverty	Moderate poverty
Pacific	55%	22%	33%
Center	69%	29%	40%
Atlantic	69%	31%	38%

Source: based on data from EMNV 2009 (INIDE, 2011)

[68] INIDE, 2011, p.22
[69] INIDE, 2011, p.17
[70] INIDE, 2011, p.17

While the reduction of the headcount poverty rates in Nicaragua are very modest or even absent in the case of extreme poverty rates, the improvements are more visible if one looks at the evolution of other variables related to well-being, for example indicators of the Unsatisfied Basic Needs Index[71]. Comparing the situation between 1998 and 2009 in the rural areas, the changes in this respect were positive, reducing the incidence of indicators such as the number of people living in the same house and sharing a bedroom (-21.0%), insufficient services (-2.42%), low education (-7.25%), inadequate housing (-9.8%) and economic dependency (-12.0%).[72] This draws attention to the fact that in the case of Nicaragua it is necessary to take a multidimensional approach in order to get a more accurate picture of the state of poverty in recent years.

On the whole the results of the last national household survey in 2009 show that the well-being of the Nicaraguan population has improved over the last decade. However, the improvements in terms of income and consumption levels are largely driven by high export prices. This raises questions about the sustainability of the observed decrease in poverty levels because the prices for agricultural products can fall any time, which would have a negative impact on household incomes, especially in the rural areas. Furthermore, the challenge persists to include a broader spectrum of the extremely poor because despite the decrease in poverty rates using poverty lines as well as the NBI show that poverty remains a major concern in Nicaragua.

After having examined the poverty situation in rural Nicaragua, the next subchapter will provide the necessary historical background about Nicaraguan agriculture and land redistributions in order to understand in which context rural poverty levels remain so high.

2.3 THE NICARAGUAN PARADOX: HIGH RURAL POVERTY LEVELS DESPITE GOOD ACCESS TO LAND

2.3.1 HISTORICAL OVERVIEW OF NICARAGUAN AGRICULTURE AND LAND REFORMS

Nicaragua has a long agricultural tradition that dates back to Spanish colonization.[73] In Central America Nicaragua has always been the country with the biggest territory and the least population. The low population density combined with a quickly expanding agricultural frontier meant that land was abundant.[74] However, the distribution of the land was very unequal. This situation, in conjunction with other elements, gave rise to tensions over land and the guerrilla conflict

[71] This Index was developed by ECLAC and is popular in Latin America since the 1980s. Its indicators include type of housing, access to water and sanitation, crowding (number of people living in the same bedroom), education and economic dependency.
[72] INIDE, 2007, p.35 and INIDE, 2011, p.41
[73] Maldidier & Marchetti, 1996, p.23
[74] Baumeister, 2009, p.390

culminating in the 1979 Sandinista revolution, which ended forty years of dictatorship by the Somoza family.

Pre-revolutionary land situation

Without downplaying the unequal land distribution before the revolution, it is interesting to note that the perceived dominance of the Somoza family and their allies was bigger than the actual quantity of land owned by them. Indeed, according to Baumeister (2009), at the moment of the revolutionary triumph, their property represented 15% of the total farm area at the time.[75] The class of businessmen known as the opposition bourgeoisie because they were not linked to the Somoza clan, made up the second big group of landowners, whose weight was also perceived as such in the population. What was often forgotten, however, was that these two groups co-existed with an intermediary stratum, which was largely underrepresented in politics and the unions but which did play a considerable role in the trade and finance sectors.[76]

Regardless of how big the actual share of the Nicaraguan elite was, the fact remained that an important segment of the rural population active in agriculture did not own the land on which they worked. Indeed, in the 1970s, 31% of rural families in Nicaragua did not have any access to land at all.[77] The high amount of landless families living in the countryside led to an important segment of agricultural laborers who worked on other people's farms for a salary.

Sandinista agrarian reforms after 1979

In protest of this unequal land distribution many of these agricultural workers started occupying land and the triumphant revolutionaries came under pressure to make the agrarian reform one of their priorities.[78] Consequently, during the 1980s a far-reaching agrarian reform was undertaken, which stressed three elements.

First of all, its main goal was to transform the way in which land was distributed. The reform therefore focused mainly on the redistribution of land having belonged to big farms, mainly of the Somoza family and their allies, debtors to banks and of those whose land was underused. This land was concentrated and given to state enterprises and collectivist co-operatives.[79] Overall the land redistribution under the Sandinista government affected 3.5 million manzanas[80], about 40% of a total farm surface of 8 million manzanas that existed at the beginning of the

[75] Baumeister, 2009, p.391
[76] Baumeister, 2009, p.392
[77] Baumeister, 2009, p.390
[78] Universitad Centroamericana - UCA, 1981
[79] Universitad Centroamericana - UCA, 1981
[80] A manzana (Mz) is a unit of land area commonly used in Nicaragua. 1 manzana equals 0.7 hectares.

revolution.[81] Another aim of the agrarian reform was to modernize the technical modes of production by intensifying a more widespread use of tractors and other machines (often originating from former socialist countries) as well as chemical input.[82] These modernization efforts were carried out on both state farms and co-operatives but did not deliver the expected results. The third element of the agrarian reform consisted in the massive extension of access to the state development bank to all strata. This bank gave subsidized credits and covered over 75% of the agricultural area, subsidizing permanent and annual crops.[83]

The first agrarian reforms put a strong emphasis on state farms and co-operatives and neglected to support individual medium- and small-scale farmers.[84] There was a process in the mid 1980s to assign land to individual small farmers as well. According to Núñez Soto, who was involved in the reform process, the Sandinista agrarian reform benefitted around 90,000 families, 41% through farming co-operatives and 59% as individuals, of which 34% were living under precarious conditions.[85] As a result, many farmers cultivated their own land.

However, there was no legal framework to maintain this situation in the long run because in most instances the farmers had not been given the official title over the property.[86] Therefore, many small producers preferred to sell their land once they got the chance in the 1990s instead of doing all the paperwork to legalize it. It is true that legalization was and is difficult, especially in more remote regions such as Jinotega and Matagalpa, for example, where the official registries are far away. In addition, agricultural workers[87] received land without knowing how to manage a farm as a landlord. Lacking the necessary know-how and technical assistance, many producers, in particular small farmers ended up struggling with their production and eventually opted for selling their land.

Land re-concentration process after 1990

Keeping this in mind, after 1990, when the liberals came back into power who adopted the strategies of the Washington Consensus, a certain counter-agrarian reform took place. Under the Chamorro government (1990-1996), the land of the farming co-operatives was broken up and the state farms were privatized. This gave many former landowners the chance to buy their confiscated land back and other affluent individuals – among them many members of the Sandi-

[81] Núñez Soto, 2005
[82] Baumeister, 2009, p.392
[83] Baumeister, 2009, p.392
[84] Ortega, 1986, p.22
[85] Núñez Soto, 2005
[86] ACTED, 2007, p.7
[87] The big farm estates were located in León, Chinandega, San Juan del Sur and Boaco. These farms were expropriated and the agricultural workers previously employed there became the owners of the land.

nista party - and firms seized the opportunity to acquire land easily.[88] Consequently, little by little a re-concentration of land began.

Despite this re-concentration process, the land distribution did not return to its initial pro-revolutionary situation as table 3 reveals.[89] The proportion of land held by the strata of large-scale farmers owning land of 500 manzanas or more fell significantly between 1978 and 2001. Towards the end of the Somoza era in 1978, they held 36% of the total farm area. During the Sandinista revolution, this proportion fell to 13.5% and increased slightly, reaching 16.5% in 2001.[90] So large-scale farmers owned more land in 2001 than in 1990 but still less than before the revolution. Table 3 furthermore shows that the weight of both the strata between 0 and 10 manzanas and 10 to 50 manzanas increased. The stratum of 0-10Mz more than doubled their share of farm area from 2.1% in 1978 to 4.5% in 2001 and the stratum of 10-50Mz went from holding 15.4% of total farm area in 1978 to 20% in 2001. The aggregated effect of widening the strata of small- and medium-scale farmers was a reduction of the average farm size from 78Mz in 1978 to 41Mz in 1988 and 2001.

Table 3: Evolution of farm area by strata and property sector 1978-2001

(in percentages, area in manzanas and number of agricultural producers)

strata	**1978**	**1988**	**2001**
0 – 10 Mz	2.1	3.1	4.5
10 – 50 Mz	15.4	16.7	20.0
50 – 200 Mz	30.1	28.4	36.6
200 – 500 Mz	16.2	12.8	18.0
More than 500 Mz	36.2	13.5	16.5
State farms	0	11.7	0.4
Co-operatives	0	13.8	4.0
total	100	100	100
AG Producers (in thousands)	104	189	218
Farm area (Mio Mz)	8.1	7.7	8.9
Average farm size (Mz)	78	41	41

Source: Baumeister (2009), p.400

[88] Baumeister, 2009, p.402

[89] Unfortunately, the most recent data is from 2001 because the results of the last agricultural census carried out in 2011 have not been published yet.

[90] Baumeister, 2009, p.400

All in all, throughout the 80s and 90s, an important portion of farm land underwent a permanent redistribution process, which is why the historical context of Nicaragua is fundamental to understanding the dynamics of Nicaraguan agriculture in the last three decades. The long period of instability marked by revolution, changes in land distribution in the backdrop of civil war and subsequent peace with a process of land re-concentration obviously had a big impact on agricultural production.

Evolution of Nicaraguan agricultural production

Table 4 shows the evolution of agricultural production, the use of fertilizers and the rural population in Nicaragua between 1978 and 2006. Taking the pre-revolutionary situation in 1978 as reference with the basis 100, agricultural production levels in 2006 only reached 82% of those in 1978 if one takes population growth into account. Productivity levels fell given that the rural population continuously increased, while agricultural production decreased significantly until the 1990s and only surpassed the pre-revolutionary levels in the first decade of the new millennium.

Productivity levels in Nicaragua have been the lowest in Central America for a long time. Indeed, at the end of the 1990s, Nicaragua's agricultural GDP was the lowest among all Central American countries although it had the highest surface used as farm land. The differences are significant as returns per hectares of Nicaragua only reached 10% of the average of the rest of Central America.[91] Among the reasons for the low productivity rates in Nicaragua was the doubling of the economically active population in the agricultural sector (see table 3), which was not accompanied by an evolution of production techniques. The civil war of the 80s and the economic embargo imposed on Nicaragua by the United States had negative repercussions as well.[92]

Table 4: Evolution of the agricultural sector in Nicaragua (1978-2006) 1978=100

	Agricultural product	Rural population	Product per rural inhabitant	Use of fertilizers
1978	100	100	100	100
1980	69	105	66	149
1985	74	117	63	157
1990	64	128	50	83
2005	122	154	79	97
2006	126	156	82	n.a.

Source: Baumeister (2009), p.395

[91] Ruiz & Marín, 2005, p.11
[92] Ruiz & Marín, 2005, p.10

1990 marked the end of a decade of civil war between revolutionary and counterrevolutionary forces. After the peace treaty was signed, many rural families decided to return to their old land and took up farming again. In this context, the average annual growth rate of 4.6% in the agricultural sector between 1990 and 2000 is to be interpreted as a recovery of the losses suffered in the 1980s.[93] This growth of the agricultural sector in Nicaragua was primarily due to a massive extension of the area under cultivation and a significant increase of the number of agricultural producers (see table 3). Since the 90s, the agricultural sector as a whole has become more intensive in labor but nonetheless the productivity of the labor force remains one of the lowest in Central America. One explanation is the disappearance of some of the channels to access credit (the issue of credit access will be explained in more detail in section 3.3), which seems to have led to a considerable decrease in the use of agricultural input.[94] Indeed, table 4 shows that the use of fertilizer for instance dropped significantly since the 1990s, which coincides with the bankruptcy of the National Development Bank that provided producers of all strata with affordable credits.

2.3.2 Explaining the Nicaraguan Paradox

Given the fact that in Nicaragua a relatively high proportion of farmers have good access to land (as discussed in section 2.3.1), it seems paradoxical that the level of extreme poverty is this high among the rural population (as discussed in section 2.2.2). Indeed, roughly 79% of rural households have direct access to land, even if it is just on a small scale.[95] This section will provide some elements of an answer to explain this phenomenon.

First of all, one has to consider that in the decades of the 1960s, 70s and 80s a very high proportion of the income of the rural population was obtained through salaries during the harvest in the export sector of agricultural products.[96] However, since the 1990s to the present day, there has been a considerable reduction of permanent salaried employment in the agricultural sector. This is due to the disappearance of the state run productive sector as well as that of the cooperatives. In addition, there was a decline in jobs in the private sector, which was caused by the elimination of cotton and wet-rice production.[97] The reduced labor demand had negative repercussions for many rural families because they could not live off their land. Indeed, the plot of land received during the agrarian reform does not feed a family if they neither have sufficient

[93] Ruiz & Marín, 2005, p.9
[94] Baumeister, 2009, p.397
[95] Baumeister, 2009, p.405
[96] Baumeister, 2009, p.407
[97] Baumeister, 2009, p.408

capital – due to low access to credit - to cultivate the land nor have the opportunity to earn wages by working on other peoples' farms.

The second reason explaining why many rural families are poor is that the minimum salary in the agricultural sector is very low and has actually declined in real terms. Indeed, the 2001 Agricultural Census shows that the minimum salary corresponded to US$1.65 per day. Assuming that a household of six includes two working members who work 365 days a year (which is a very strong assumption on both accounts) the income results in US$0.55 per day per person, which is equal to the consumption line of extreme poverty.[98] Thus, both the decline in labor demand and the falling real income have made it difficult for rural families to rely on salaried labor to sustain themselves as they did in the past. As a result, a growing number of the rural work force goes abroad to do seasonal work in Costa Rica, Honduras and El Salvador, where the salaries are higher than in Nicaragua, even under illegal conditions. Still today, the differences in salaries are enormous: For 2012, in Nicaraguan the minimum wage in the agricultural sector lies at US$3 per day[99], whereas the agricultural workers in Honduras can expect to be paid US$8.40 a day[100] or even US$15.50 a day[101] in Costa Rica.

Another important element to explain the Nicaraguan paradox are the chronically low productivity rates, which remain the lowest in Central America as was discussed in section 2.3.1. It should also be also kept in mind that access to credit for small producers was reduced in the last decade, which has made the production of basic grains more difficult. In the 80s, many small farmers received rural credits from the National Development Bank and were used to working with credits from the state bank, which allowed them to buy chemical inputs, seeds and represented a small salary.[102]

According to Baumeister's (2009) assessment, the results 16 years after the revolution were ambivalent for agriculture and the rural population. The big losers were salaried workers and producers with semi-proletarian characteristics. Not only did they suffer from the significant reduction of jobs in state farms and the loss in real income (fundamentally due to the disappearance of payments in kind made up of rice, red beans and oil). But in addition a big part of workers linked to state firms did not receive any land during the property negotiations after

[98] Baumeister, 2009, p.408
[99] www.mitrab.gob.ni: 71.50 *cordobas* equal 3.07 dollars depending on the exchange rate that day (1US$=23.29 C$ on 11/04/12)
[100] www.trabajo.gob.hn: 160.65 *lempiras* per day equal 8.43 dollars based on an exchange rate of 1US$=19.06 L (as of 11/04/12)
[101] www.mtss.go.cr: 7.883.82 *colones* per day, which equal 15.53 dollars based on an exchange rate of 1US$=507.60 ₡ (as of 11/04/12)
[102] Baumeister, 2009, p.409

1990.[103] Consequently, some of these workers moved to the cities or migrated abroad in the hope of escaping poverty.[104]

Baumeister (2009) furthermore points out that as opposed to Honduras, Costa Rica and Guatemala, Nicaragua has not been able to consolidate an important sector of non-traditional agricultural products, such as fruits and vegetables for the world market. The latter require a big amount of labor and a higher productivity per surface unit. In parallel, one observes a lower development rhythm of the food industry, which led to increased imports of basic foods after 1990. In 2009, for instance, the top imports of Nicaragua were processed crop and livestock products, rice, palm oil and wheat.[105] For the same year, the trade balance for most agricultural products was negative including grains and vegetables, the main exception being meat and dairy products.[106]

Overall, by the beginning of the 21st century Nicaragua has failed to develop a more intensive agriculture with better business income, salaries and money, covering different production strata including smallholder farmers. Among the reasons for not getting on this development path are the lack of medium and long term state action, the lack of infrastructure development, insufficient creation of human capital (technical know-how) and insufficient credit access.

Chapter 3 will look into these factors in addition to others to investigate the characteristics and situation of smallholder farmers in Nicaragua in more detail. The aim is to present a profile of smallholder farmers who are the main protagonist in the countryside when it comes to understanding Nicaragua's chronically high rural poverty rates.

3. CHARACTERIZATION OF SMALL FARMERS

3.1 DEFINITION OF SMALL FARMERS, PRODUCTION SYSTEMS AND AGRARIAN REGIONS

3.1.1 AGRARIAN REGIONS AND PRODUCTION SYSTEMS

Any characterization of agricultural producers in general and smallholder farmers in particular has to take regional differences into account. In Nicaragua one can roughly differentiate between the rural areas of the three macro-regions[107]:

[103] Baumeister, 2009, p.410
[104] www.ruralpovertyportal.org/web/guest/country/home/tags/nicaragua (accessed on 11/04/12)
[105] http://faostat.fao.org/ (accessed on 19/04/2012)
[106] International Trade Center: http://legacy.intracen.org/appli1/TradeCom/TP_IP_CI.aspx?RP=558&YR=2009 (accessed on 19/04/2012)
[107] Baumeister & Rocha, 2009, p.16

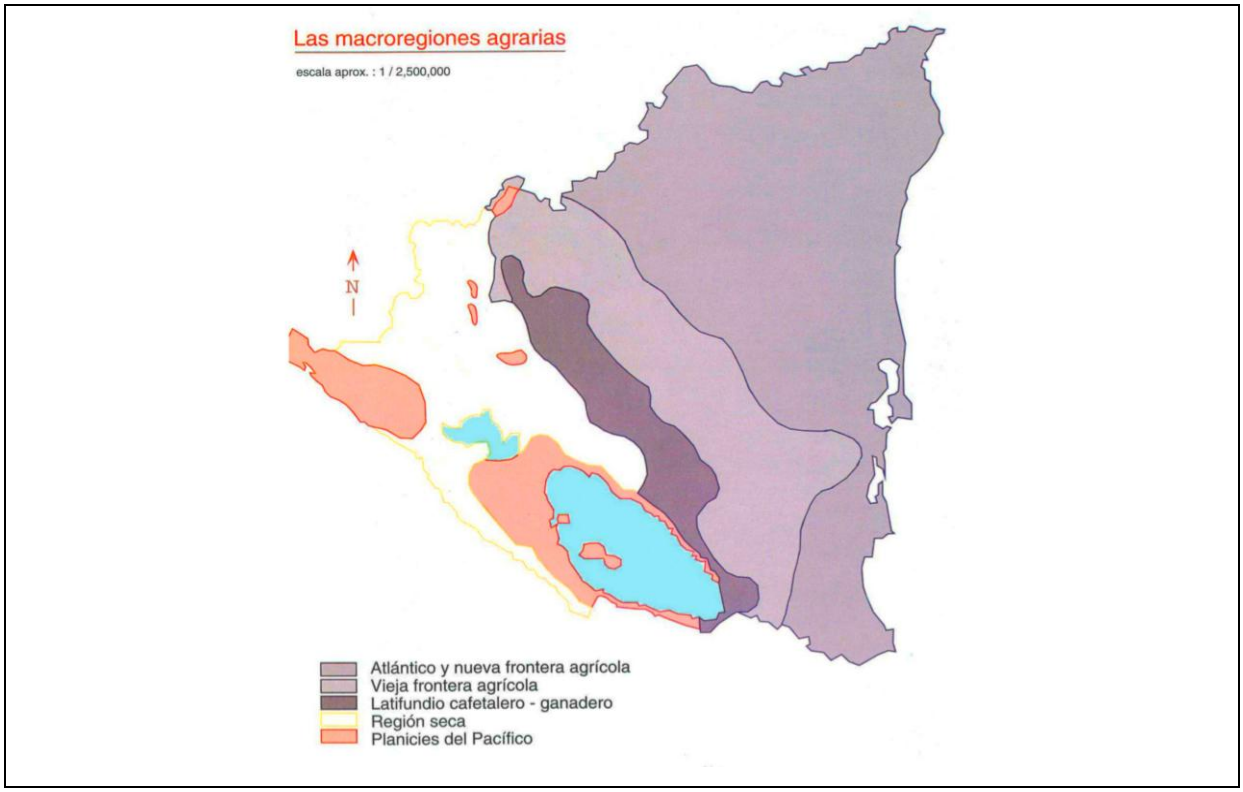
1) The Pacific, which includes the areas with the oldest settlements and in which the main urban centers are situated, and where the land is flat. Here a lot of cotton used to be produced. Nowadays, the main commercial crops are sugar cane, peanuts and others.
2) The Central region, with higher elevation where mostly coffee and livestock is produced as well as basic grains.
3) The Atlantic region (Caribbean), which combines the agricultural frontier and territory of indigenous populations.

This first classification is not sufficient however because Nicaragua is a very heterogeneous country from both an agro-ecological as well as socio-economic point of view. Thus, when investigating the potential of agricultural producers it is important to consider a regionalization, which takes these aspects into account. Indeed, many of the most relevant determining factors of agricultural producers depend on the location and socio-economic surrounding, in which they live. The nature of the soil, terrain, climate – especially the rain patterns[108] – and other physical factors influence the possibilities to manage a farm. Other factors influencing the agricultural potential are related to the accessibility of services and markets, population density[109], availability of land, etc.[110] These agro-ecological and socio-economic aspects determine the different economic rationales and production systems adopted by the agricultural producers. In fact, "every type of producer is the result of a unique combination of socio-historic and agro-climatic elements, and a certain resource endowment (capital, labor and land)."[111]

Not surprisingly, the classic divisions of the country in *departamentos* and municipalities present limits to understanding the agricultural realities. Therefore, Nitlapán - a Nicaraguan institute specialized in the research, creation and dissemination of new models and methodologies for local development, both rural and urban – developed a regionalization, which describes and explains the agro-social diversity of the country. The six identified agrarian regions illustrated in figure 5 are the result of combining the agro-ecological zones with the socio-economic zones.[112]

[108] Nicaragua has a dry season, which lasts from November to May, and a rainy season, which lasts from May to November in the most parts of the country.
[109] For, instance, the Pacific region only makes up 15% of national territory but includes 54% of the population including Managua. (Baumeister & Rocha, 2009, p.16)
[110] Ruiz & Marín, 2005, p.17
[111] Ruiz & Marín, 2005, p.72
[112] Maldidier & Marchetti, 1996, p.36

Figure 5: Map of agrarian regions in Nicaragua



Source: Nitlapán (1996), p.41

1) The Atlantic and the new agricultural frontier

The Atlantic region is home to several indigenous communities and has only been colonized for agricultural purposes since the 1980s. Since then, the large extensions of forest have increasingly come under pressure from extensive livestock production.[113] The Atlantic region is characterized by its tropical humid climate but the soil is acidic and of low mineral fertility, which makes it more suitable for forestry than crop production. Infrastructure is still limited to few paved roads, which makes communication with the rest of the country difficult. Other characteristics include a low population density, serious conflicts over land ownership, natural resources and ecological unsustainability (e.g. deforestation).[114]

2) The old agricultural frontier

This is a region of the semi-humid to humid tropics, which used to be the agricultural frontier in the 1940s, 50s and 60s. Peasants with access to land predominate here who are relatively integrated into the market, although this varies strongly according to the type of farmer. The northern part of this region is characterized by moderately mountainous areas where the soil

[113] Maldidier & Marchetti, 1996, p.43
[114] Ruiz & Marín, 2005, p.19

quality varies between fertile and acidic. Where the conditions are appropriate, many small-scale farmers grow coffee. There is more intensive production of basic grains and livestock in Pantasma and El Cuá, for example. In the southern part of this region the agro-ecologic conditions resemble that of the Atlantic region, as is the case around Nueva Guinea and El Rama. In general, it rains during seven to nine months a year, which allows the cultivation of several crop cycles, such as basic grains but also citric fruits.[115]

3) The large coffee and livestock estates

This region is situated in the central interior of the country, where the medium- and large-scale production of coffee and livestock predominate. The presence of small farmers basically consists of dispersed pockets of poor peasants who work as agricultural labor on other farms. As of 2001, the year for which the last data is available, the distribution of land was still highly unequal.[116]

One can differentiate between two big agrarian zones. The first zone includes the *departamentos* of Matagalpa and Jinotega with an altitude of 600-1500 meters, relatively cool temperatures and high rainfall, constituting ideal conditions for coffee production. As opposed to the two previous agrarian regions, the network of roads is more or less developed, which enables a swift transport of the coffee harvest. The second zone includes the *departamentos* Matagalpa, Boaco and Chontales with altitudes of 400-600 meters. The dominant agricultural activity is livestock production with a focus on dairy products. [117]

4) The dry region

This region has a dry or semiarid climate with a scarce rain regime. In addition, the annual rainfall is distributed very badly, meaning that there is no rain throughout most of the year with sporadic heavy downpours in the rainy season. Lack of water is a fundamental obstacle for agricultural production in this region. Therefore its land is mainly utilized for extensive livestock farming. Production of basic grains is also wide-spread but due to the scarcity of water, usually only one crop cycle can be harvested each year.[118] This is one of the reasons why large portions of the smallholder farmers of this region are severely pauperized. Despite the proximity to several urban centers, the situation regarding road infrastructure and thus market access varies. One of the most important roads is the Pan-American Highway, which crosses the region from

[115] Maldidier & Marchetti, 1996, p.47
[116] Ruiz & Marín, 2005, p.37
[117] Ruiz & Marín, 2005, p.35
[118] Ruiz & Marín, 2005, p.44

north to south. While some parts of the territory have a network of roads that is passable in vehicles, the rest has more difficult access, only by foot or beast.

5) The plains and plateau of the Pacific

This region is composed of two big geomorphologic zones. The first zone is characterized by plains of volcanic soil of excellent agronomical quality because it is fertile and retains water easily, although it is prone to erosion. In this area agricultural production is more intensive in the capital than in the rest of the country. This is the case for both the large-scale productions of sugarcane and peanuts as well as the small-and medium-scale productions of basic grains, fruits, horticulture and sesame. The second zone consists of a plateau and hills with an elevation of 800-900 meters. The rain regime in the entire region is globally favorable for agriculture. In the higher altitudes the climate is cooler and thus suitable for the cultivation of coffee.[119]

The economic infrastructure in this region is the most developed in the country. It concentrates the national agro-industry and has a good network of paved roads, which allows an easy access to the main ports and urban centers of the country. Five of the six biggest cities (Managua, León, Granada, Masaya and Chinandega) are located in this region, which explains the high population density.[120]

6) The peri-urban smallholdings

This last agrarian region is characterized by a strong presence of smallholder farmers who live in the highly populated areas around the major cities of the country, especially the capital Managua, and who have a strong link to the urban economy. The rain regime is favorable but the depth of the groundwater reservoir makes it difficult to access the water for human consumption. A big part of the agricultural activity is based on the cultivation of high value crops, such as (citric) fruits and vegetables. In this region there is good access to markets and the neighboring cities. So in addition to farming, many farmers engage in non-agricultural activities as well, such as crafts.[121]

3.1.2 GOING BEYOND TRADITIONAL DEFINITIONS BY LAND SIZE

As mentioned in the introduction, smallholder farmers are the main target group of a whole variety of institutions that are active in the rural sector. Government programs, local as well as international NGOs and social enterprises, such as iDEal Tecnologías all aim to reach poor

[119] Maldidier & Marchetti, 1996, p.62
[120] Ruiz & Marín, 2005, p.59
[121] Ruiz & Marín, 2005, p.68

smallholder farmers in order to improve their livelihood through one way or the other. However, while it is very common to hear these actors speak about small-scale farmers or small-scale producers (it is most common in Nicaragua to refer to smallholder farmers as *pequeños productores* to emphasize their potential to contribute to the country's development[122]), the discourse is hardly differentiated. One the one hand one could get the impression that smallholder farmers are a homogeneous group. And on the other hand, it is not very clear who is actually meant by the term, or to put it differently, what characteristics this famous small-scale farmer has.

Traditional definitions by land size

The conventional method to distinguish between small-, medium- and large-scale farmers is based on land size for farming. The Nicaraguan Ministry for Agriculture and Forestry (MAGFOR) defines a smallholder as someone who cultivates between 0 and 50 manzanas[123] or has between 0 and 200 manzanas for livestock. A medium-scale farmer is defined as someone who cultivates between 50 and 500Mz or dedicates 200 to 1000Mz to livestock production. According to the conventional definition a farmer would be considered large-scale if he cultivates over 500Mz of land or dedicates over 1000Mz to livestock production. In practice, these indications vary largely according to the crop. In the case of coffee, for instance, someone who cultivates less than 1Mz is considered a marginal producer who can barely live off his harvest. A subsistence farmer cultivates between 1 and 15Mz. In general, it is necessary to have at least 5Mz of coffee in order to have the potential to grow and make a good living.[124] A producer is considered medium-sized if he cultivates 15-50Mz of coffee and the large-scale producer has over 50Mz at his disposal.

Criticism of the traditional land size approach

Although it might seem intuitive to take land size as the main criterion, this indicator is highly problematic for several reasons. The main issue is that the size of the land cultivated does not necessarily reveal how much money can be made from the production and so it does not necessarily reveal the socio-economic situation of the farmer. Indeed, there are farmers with little land who have a big economic capacity and at the same time farmers exist with quite a bit of land but who have an insignificant economic capacity.[125]

First of all, the size does not reveal the quality of the land in terms of soil quality and fertility, geographic and strategic location etc. Not surprisingly, land prices vary according to the location

[122] Núñez Soto, 2006b, p.90
[123] 1Mz = 0.7ha
[124] Interviews with María Monge (E2), Peter Hach (E6) and Francisco Zamora (E7)
[125] Núñez Soto, 2006b, p.95

and public services provided in the region. If there is infrastructure in form of roads and access to markets as well as availability of water and electricity the value of the land increases.[126] As a result, land prices in regions providing these basic services and being situated in proximity to urban areas with good access to markets are a lot higher than in other parts of the country, where these conditions are often not met. Therefore, possessing land in these regions makes the owner wealthier than somebody with the same size of land in more isolated regions. This is because on the one hand the farmer could obtain capital for his production by selling (part of) the land and on the other hand the conditions in the region make it more likely for these farmers to produce and commercialize successfully. One has to keep in mind, however, that while the high land prices reflect the advantages of the land at the same time the high land prices make it very difficult if not impossible for poor farmers to acquire land in good locations.[127]

Another reason land size does not reflect the actual socio-economic situation of farmers is that it does not take into account that the fertility of the soil and the availability of water make a significant difference to the quantity and quality of the harvest. For instance, the Pacific coast is blessed with fertile volcanic soil due to its proximity to the volcano chain running through the country although overexploitation and the intense use of toxic chemicals in León and Chinandega have impoverished the soil. In the Atlantic coast, which makes up almost half of the national territory of Nicaragua, however, the soil has high sand content and is thus better suited for forestry than agriculture.[128]

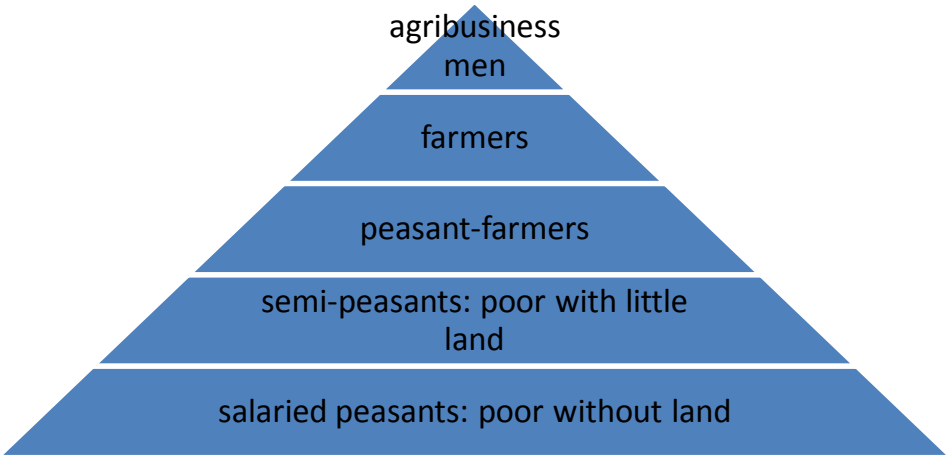
In addition to land conditions, the type of crop makes a big difference when it comes to determining how much income can be generated from a certain area of land. Indeed, producing high value crops such as fruits, vegetables or coffee on a small patch of land is often more profitable than producing basic grains on a plot of land several times the size. So the definition of small farmers based on land size varies according to the region and crop and as a result is not very useful for institutions with activities in several regions and not restricting themselves to farmers producing specific crops only. While land is a necessary criterion it is not a sufficient one because other factors need to be taken into account, such as the location in relation to infrastructure and markets, soil return, the investments that the plot or farm has as well as the performance of the farmer.

[126] Núñez Soto, 2006a, p.40
[127] Interview with Peter Hach (E6)
[128] Interview with Francisco Zamora (E7)

Alternative definitions going beyond land size

Researchers at Nitlapán developed a framework that conceptualizes the different types of farmers and production systems (agro-ecologic zones, existing technology and level of capitalization) in Nicaragua. Their 1996 study *El Campesino-Finquero* was a big step forward in recognizing that the definition based on land size was inadequate and that the smallholder farmers were a very heterogeneous group.

Figure 6: Social pyramid of the agricultural sector in Nicaragua



Source: own representation based on Nitlapan (1996) definition

Nitlapán did an excellent analysis of the agrarian regions of Nicaragua and came up with a classification of different types of agricultural actors, which is illustrated in figure 6. The fact that their framework distinguishes between numerous subgroups reflects the complexity of the agri-social reality. However, 24 types of agricultural producers are too many to be managed by NGOs or companies wanting to engage with smallholder farmers. This thesis therefore builds upon the more practical definition developed by CIPRES, a research center specialized in rural development.[129]

The main criterion used by the researchers at CIPRES to identify different types of producers is the way of extracting surplus, which includes the fundamental origin of their income, the productive system, and their place in the value chain.[130] They use the following variables to determine the latter:

- Family or hired labor force
- Invested capital in farming
- Access to the lower, intermediary or higher links of the productive value chain

[129] Centro para la Promoción, la Investigación y el Desarrollo Rural y Social (CIPRES): www.cipres.org
[130] Núñez Soto, 2006b, p.91

Table 5: Overview of principal form of capital used by farmer type

Producer	Natural capital (Labor force)	Market capital (production of goods)	Industrial capital (finance, trade)
Smallholder	The family as **principal** resource	Limited	rare
Medium-scale	Direct work and little hiring, mostly seasonal	**principal**	limited
Large-scale	Permanent hiring	sufficient	**principal**

Source: CIPRES (2006a), p.91

Based on these variables, a smallholder farmer is defined by the combination of the following characteristics.

- **The family as the main force of labor**

Smallholder farmers do the farming work themselves with the help of their family members. It is sometimes the case that some family members such as siblings or grown up children are paid in order to help out on their relative's field. Usually, the costs are neutralized in the end because they work on each others' fields. What distinguishes small-scale farmers from the medium-scale farmer is that they hardly ever employ other agricultural workers on their farms. It may occur that smallholder farmers, for example those who cultivate coffee, hire somebody during the harvest for a few days but as opposed to the medium-scale farmer they never hire employees throughout the entire cultivation period of nine to twelve months.

- **No investment into farming**

The economic capacity of smallholder farmers proceeds from the labor of the family and the plot of land they hold. This natural capital provides very low profit margins and most small-scale farmers have to find other sources of income in order to get by. Their farming activity barely allows them to earn enough to sustain their family or to pay the debt if they took out a loan. Among smallholder farmers the saying goes that "they did not even earn their labor."[131] At the end of the day, they have no money at their disposal, which could be invested into the farm. As opposed to the medium-scale farmer they cannot acquire more land or invest into better agricultural input. As a result they use very rudimentary and old farming techniques and have hardly any access to technology.

[131] Interview with Peter Hach (E6)

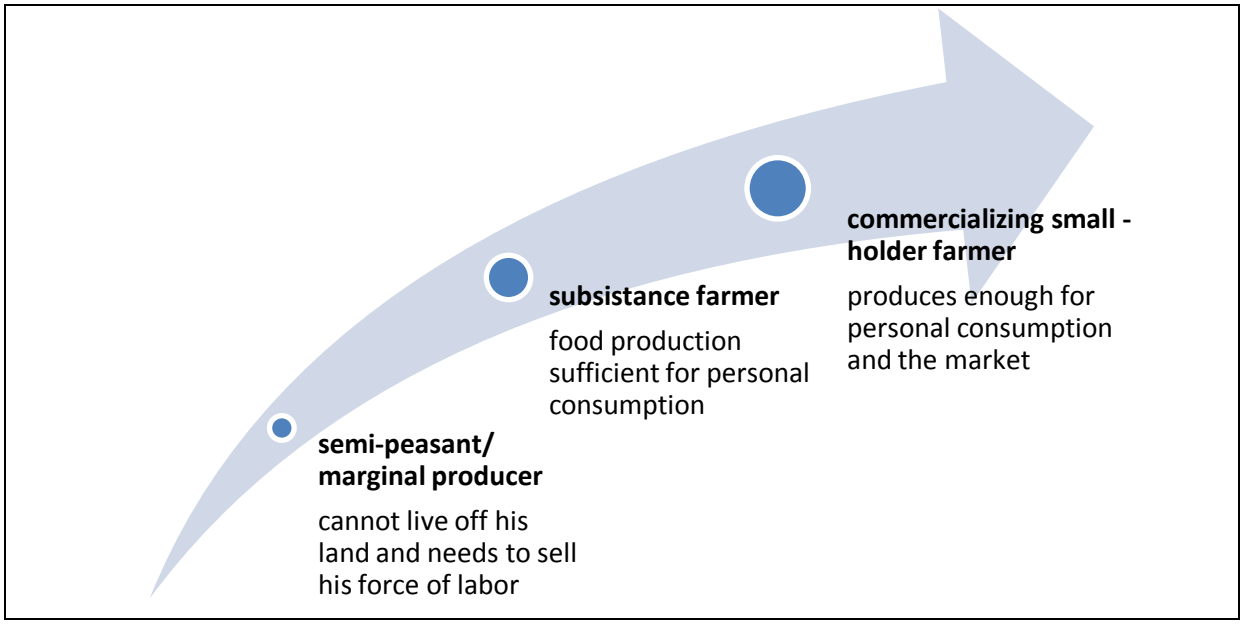
❖ **At the bottom of the value chain**

Smallholder farmers are at the very bottom of the value chain because they tend to sell very basic products. They do not engage in any activity to increase the value of the product in its raw state and as a result they are paid a low price. For instance, they sell the corn when it is still humid (in a state called *verde*) or sell the coffee cherry and not the dried beans. They cannot dry the harvest themselves because the plastic sheets are very expensive and they would have to employ people to turn over the seeds from time to time.[132]

When speaking of added value, one can refer to very simple things such as removing twigs and dirt from the harvest in order to get a better price for it. Other basic actions could be storing the produce to sell when the prices are higher, i.e. during the dry season, or cancelling out the middle man by selling directly to the market if logistically possible. However, most smallholder farmers do not have the financial capacity to perform these steps and as a result have hardly any negotiating power when determining the price of their harvest.

Once smallholder farmers are distinguished from medium-scale producers, it is possible to identify three segments within the group of smallholder farmers as figure 7 summarizes.

Figure 7: Different types of smallholder farmers



Source: own illustration

[132] Interview with Peter Hach (E6)

1. Semi-peasant or marginal producer

This group of smallholder farmers is characterized by neither sure nor sufficient access to resources and lives under precarious conditions. With only tiny plots of land at their disposal (micro-farms), they have no chance at sustaining their family through their agricultural activity alone, regardless of the agro-ecological region they live in. Therefore, these poor farmers with little access to land are obliged to find work outside of their farms as agricultural day laborers. According to research by CIPRES, this segment corresponds to 75% of all peasants and 56% of all smallholder farmers.[133] The rest of the identified producers in this group are farmers who work outside of their farm in non-agricultural activities and smallholder farmers who rent insignificant amounts of land.

2. Subsistence farmers

Subsistence farmers own farm land within the categories of small farms, which have the following sizes according to different agrological areas[134]:

- Less than 10 manzanas in the plains and plateau of the Pacific region
- Up to 25 manzanas in the dry region and the large coffee and livestock estates
- Up to 50 manzanas in the Atlantic (Caribbean) region

According to the CIPRES study, this type of smallholder farmer generally is in the beginning stages of development but is limited by the space that can be exploited. In order to satisfy the needs of the family, they make complete use of family labor. The most representative form of a subsistence farmer is a family peasant who has certain limitations to land access but whose productive systems guarantee the food production for personal consumption. The crops are dedicated for internal consumption, livestock has a double purpose (provide food or food products for the family and can be sold) and some cultivate crops for export.

3. Commercializing smallholder farmers

This group generally consists of farmers with small productive systems, which are sufficient to sustain the family according to the predominant agricultural activity of the region. Some commercializing smallholder farmers own medium-sized farms, having received the land during the process of agrarian reforms (either as an individual or as part of a co-operative). What sets the commercializing small-scale farmer apart from other small-scale farmers is the commercial tendency of his productive system. Unlike the semi-peasant or the subsistence farmer, he has the

[133] Núñez Soto, 2006a, p.69
[134] Núñez Soto, 2006a, p.69

possibility to produce enough for personal consumption and for the market. Therefore, commercializing farmers try to link up to the value chain that connects to the local, regional and even global markets.

3.2 WEIGHT AND CONTRIBUTION OF SMALLHOLDER FARMERS TO NATIONAL AGRICULTURAL PRODUCTION

After having explained why the traditional method of identifying smallholder farmers by the size of the land they cultivate tends to give an erroneous view of their socio-economic situation, this subsection turns its attention to the weight and contribution of smallholder farmers to the national agricultural sector.

Importance of the agricultural sector to Nicaragua's economy

Nicaragua is a country with a long agricultural tradition, which is based on the excellent characteristics of its soil, abundant surface and ground water resources for irrigation, favorable climate conditions (even if some areas are affected by seasonal droughts) and a human potential with a big farming tradition.

Historically, the agricultural sector, including livestock, forestry and fishing, was of great importance to the national economy. Between 1995 and 2000 it accounted for roughly 30% of national GDP and absorbed 37% of the economically active population in 2000.[135] In the last decade the contribution to national GDP dropped but remains constant at about one fifth of national GDP: 20.5% in 2000, 20.2% in 2005 and 20.6% in 2010.[136] According to the National Central Bank, in 2010 Nicaragua's GDP amounted to USD 6.551,5 million of which USD 1.889,9 were produced by the agricultural sector.

The big majority of products generated by the Nicaraguan agricultural sector are foodstuffs, either for internal consumption i.e. basic grains, meat and vegetables) or for export (i.e. sesame, coffee, peanuts), which renders Nicaragua's agricultural sector primarily food oriented.[137]

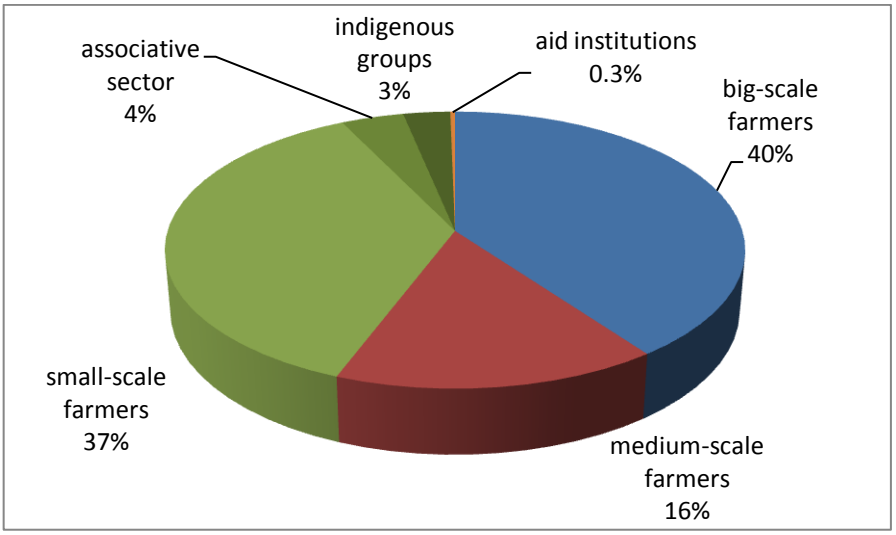
Considerable role of smallholder farmers in Nicaraguan agriculture

Regarding the contribution by percentage of the different productive sectors, the weight of the small- and medium-scale farmers to the value added of the agricultural sector is considerable. Figure 8 shows that in 2004 small and medium sized producers, including the associative sector (i.e. co-operatives) and the indigenous communities, contributed almost 60% of agricultural

[135] Ruiz & Marín, 2005, p.14
[136] Nicaraguan Central Bank (2010). "Nicaragua en cifras 2010".
[137] Núñez Soto, 2006b, p.101

GDP, whereas the large-scale farmers accounted for the other 40%. Smallholder farmers as a group in their own right accounted for 37% of added value from the agricultural sector and 44% if one adds the associated sector as well as indigenous groups, which typically consist of smallholder farmers as well.

Figure 8: Contribution of different strata to agricultural GDP (2004)



Source: based on table nº23 in Núñez Soto (2006a), p.104

Looking at these numbers it becomes clear that the Nicaraguan agricultural sector is not entirely dominated by large-scale farmers and businessmen as one might assume but that smallholder farmers contribute to agricultural production to a considerable extent. Even when it comes to other aspects, the importance of smallholder farmers for Nicaraguan agriculture goes largely unrecognized by the general public. Table 6 gives an overview of several components of the agricultural sector and the respective parts small, medium and big producers play.

Table 6: Socio-economic weight of smallholder farmers in 2004 (in %)

aspect	small	medium	big	total
Agricultural producers	90	6	4	100
Land as farms	55	14	31	100
Incorporated labor	74	11	15	100
Agricultural GDP	44	16	40	100
Food production	49	16	35	100
Agricultural exports	35	21	44	100
Basic grains	68	11	21	100
Units of cows	37	28	35	100
Units of poultry	73	11	16	100
Units of pigs	77	12	11	100

Source: Núñez Soto (2006a) based on CENAGRO 2001, MAGFOR and Central Bank, p.135

The first aspect that catches one's attention is that 90% of agricultural producers can be considered small-scale farmers. So just in terms of numbers they are a group worth understanding better. Another remarkable fact is that the majority of farm land (55%) is in the hands of small-scale producers. So compared to the situation in many other parts of the world, access to land is not one of the major concerns for small-scale producers in Nicaragua. And this remains the case as of 2004 despite a re-concentration process that took place after 1990.

Furthermore, the weight of smallholder farmers is reflected by the fact that they incorporate 74% of the total agricultural labor force. As opposed to many studies or census, the CIPRES study actually takes into consideration that rural labor often includes unsalaried work by individuals cultivating their own land or family members helping out on the farm or in the household (as is the case for most women). The number also reflects the importance of seasonal workers who are hired by some smallholder farmers during the peak of the harvest period.

Regarding food production, the contribution of small-scale producers in providing the national food supply can be considered strategic (68% of basic grains), keeping in mind that the production of corn, beans, fruits and vegetables and meat is basically in the hands of small-scale producers. Núñez Soto, the main author of the CIPRES study on small- and medium-scale farmers, points out that the contribution of smallholder farmers to agricultural GDP is underestimated because it does not include the production of pigs and chicken by individual families but only that which is produced on farms of a bigger scale.[138] To counter this phenomenon, table 6 therefore includes the contribution of each producer in possession of poultry and pigs.

When it comes to exports the results of the study by CIPRES shows that small- and medium-scale farmers together generate the majority of the country's inflow of foreign currency (56%). This is all the more so when one considers net foreign exchange because small-scale producers spend less on imported agricultural input and fuel than large-scale producers.

On balance, if one compares the control over the land and the value of production, one notices that smallholder farmers have a fair share of available land but that they contribute less to national GDP because of the little capital invested in their field, although they generate more jobs.

[138] Núñez Soto, 2006b, p.134

Big contribution of smallholder farmers not reflected in income generation

Up to this point, one might perceive the socio-economic situation of smallholder farmers to be favorable given that they contribute so much to national agricultural production. This is not the case however. Despite the considerable role small-scale farmers play in Nicaragua's agricultural sector, their big contribution is not reflected in the income generated through their agricultural activity. Indeed, per capita income is inversely proportional to the farm's size. While large-scale farmers have an average annual income of US$10,496 and medium-sized producers US$8,584, smallholder farmers only earn US$1,547.[139] These numbers reveal the level of impoverishment of smallholder farmers as well as the unequal distribution of wealth. So those who generate wealth do not always reap its benefits. This explains why most smallholder farmers fall short of the income threshold that would allow them to reach the consumption level necessary to sustain their family. In other words, they fall below the poverty line.

In light of this contradiction, it is crucial to understand what the conditions of smallholder farmers are that can explain why they struggle so much to make a living despite the fact that they contribute considerably to national agricultural production. The next section therefore focuses its attention on the characteristics of smallholder farmers. The profile will consider dimensions affecting their well-being as well as variables that are important for an agricultural producer in order to be successful in terms of production and commercialization.

3.3 CHARACTERISTICS OF SMALLHOLDER FARMERS

In order to collect data for the profile of smallholder farmers in Nicaragua 50 customers of iDEal Tecnologías in nine different *departamentos* situated in five of the six agrarian regions were visited (see table 7). The new agricultural frontier of the Atlantic coast was left out because iDEal Tecnologías is not present in that region and because access to that part of the country is particularly difficult.

[139] Núñez Soto, 2006b, p.136

Table 7: smallholder farmes visited for data collection

Agrarian region	Departamento	Number of producers (N=50)
Old agricultural frontier	Jinotega	9
Large coffee and livestock estates	Matagalpa Boaco	11
Dry region	Chinandega Madriz Estelí	10
Plains of the Pacific	Masaya Rivas	10
Periurban smallholders	Masaya Managua	10

Source: own illustration

The profiling tool used during the visits can be consulted in Annex 2. It includes information about land size and the portion under cultivation, characteristics of the farm and farming practices as well as about education and access to health services. During these field visits the Progress out of Poverty Index (PPI) was also applied to get an estimation of the poverty likelihood of the household (in Annex 1 see table 12 for PPI indicators and table 13 for poverty likelihoods). Additional information about the situation regarding food security was gathered through secondary literature because the questions to determine the Household Hunger Scale were not received well during the testing phase.

Table 8 gives an overview of the variables considered for the profile of smallholder farmers. This subchapter will analyze their situation regarding these variables.

Table 8: Variables for the profile of smallholder farmers

Socio-economic variables	Agricultural variables
• Sources of income/ PPI • Education • Access to health services • Food security	• Access to land and land use • Financing and access to credit • Access to agricultural input and seeds • Access to technology and good agricultural practices • Destination of the harvest & access to infrastructure and markets • Crop diversification

Source: own illustration

3.3.1 SOCIO-ECONOMIC CONDITIONS

Sources of income and livelihood strategies

It is very difficult to estimate income levels because most farmers do not keep track of their household resource flow. For an approximation of the socio-economic conditions, the Progress out of Poverty Index (PPI) was applied. According this poverty assessment tool, 54.7% of the 50 smallholder farmers visited fall below the national poverty line of US$1.17 per person per day[140]. This result should be considered with caution because the sample is far below the recommended size of 200. For both of these reasons the field research focused primarily on identifying different sources of income in order to get an idea of the most common livelihood strategies adopted by Nicaraguan smallholder farmers.

The latter refers to the choice of activities made in order to provide them with money, building materials and food needed to cover their basic needs. Rural households are heterogeneous because they have different capital endowments. Families define their livelihood strategies by trying to make the best use of the resources and assets available to them, and thus to exploit their capabilities to the utmost.[141] For example, smallholder farmers with good natural resources (land, water, forests) explore the agricultural route and combine it with other activities outside agriculture, whereas other rural households with very little natural capital survive of precarious

[140] The current PPI score card is based on indicators of the EMNV 2005, which defines the national poverty line as US$427.67 per person per year (INIDE, 2007, p.4)
[141] Rello & United Nations. Economic Commission for Latin America. Subsede de la CEPAL en México, 2001, p.22

subsistence agriculture, supplementing the latter with wage labor and emigration (seasonal or permanent).

The vast majority of smallholder farmers visited during the field research lived principally off their agricultural production. One of the main points in this respect is that agricultural production is not permanent and as a result the farmer's income is inconsistent. There are periods of harvest when money enters the household but during the other months, the farmers have to manage with what is left from the last sale.

A major issue for many is that they use a very basic accounting approach: Money enters one pocket and leaves the other. Most smallholder farmers do not do any kind of book-keeping and many are oblivious to the fact that income does not equal profit but that they need to subtract the costs of the upfront investment. Instead, it is common that many small-scale farmers live from one day to another and therefore do not spread their income adequately over the unproductive season. Indeed, psychological research shows that "even with resources, the poor may be unable to exercise the levels of self-control to balance their consumption across the present and the future."[142]

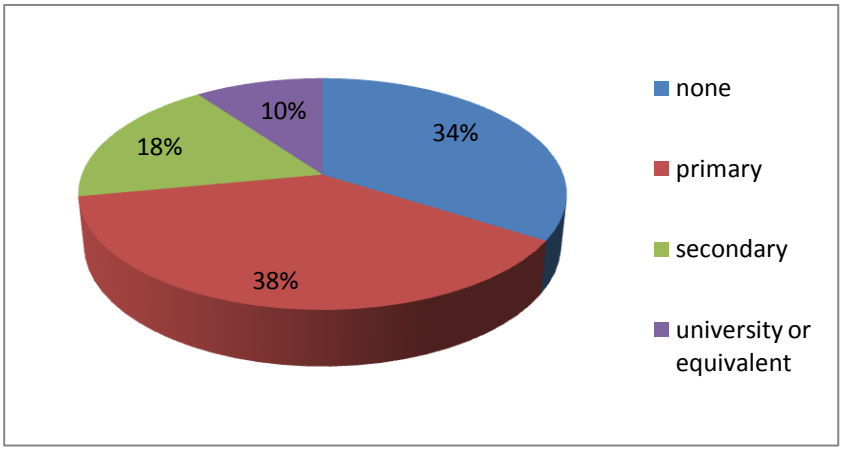
The most vulnerable people in rural areas include the families of small-scale farmers and landless farm workers, and families that combine both agricultural and other income-generating activities on the farm. Indeed, off-farm activities such as commerce, handicraft, fishing etc. are an important source of income.[143] In most rural families, at least one member works off the farm. Therefore, the stereotype of the peasants who live only for the exploitation of natural resources is no longer valid.[144]

Education:

Concerning education, the level of education among Nicaraguan smallholder farmers is still low. Figure 9 shows that 34% of the farmers visited had not completed primary school, which includes those who did not received any schooling at all. In either case, the person was not able to read or write. Again, the sample is not representative of the general population. To compare, the 2010 household survey by FIDEG reveals an illiteracy rate of 24.4% in rural areas.[145] However, the result of this study is consistent with FIDEG's finding, according to which the average Nicaraguan living in the countryside only visited school for an average of 3.9 years.[146]

142 Chakravarti, 2006, p.369
143 Núñez Soto, 2006b, p.97
144 Rello, 2001, p.23
145 FIDEG, 2011, p.17
146 FIDEG, 2011, p.18

Figure 9: Level of education completed by smallholder farmers



Source: own research

In the countryside there is a big willingness on behalf of the parents to send their children to school. The problem lies in the fact that most schools only go up the 6th grade and the secondary schools are often very far away. Therefore, many children end up dropping out of school after having reached primary education because their parents cannot afford the bus fare among other things.[147] This was especially the case during the last two decades, when schools were encouraged to partially finance themselves, resulting in contributions on behalf of the students' parents.[148] This situation reflects in the educational level of today's adults. Indeed, 38% of the smallholder farmers completed primary school but only 18% finished secondary school.

The quality of education is an entirely different issue that needs to be taken into consideration. Especially in rural areas, good and dedicated teachers are scarce and school attendance is sporadic at times. During the rainy season, for example, many dirt roads become difficult to use or even impassable, which means that many children stay home or sometimes it is the teacher who does not show up to class.

Access to health services:

Only two of the 50 small farmers visited had a basic first aid kit in their house or on their farm. In Nicaragua basic health care centers are free of charge but the access to these services varies largely from region to region. Especially the smallholder farmers in remote areas like Matagalpa and Jinotega, for example, complained about their experiences. It was mentioned repeatedly that they have to walk to the health centers for hours, just to wait in line all day and then be asked to come back the next day because the attending nurses always leave on time. To avoid this, some

147 Quintana Flores, 2011, p.24
148 Spalding, 2009, pp.368/369

families rather opt to take their children to a private hospital that is less crowded but this amounts to a significant financial burden.

Usually, people only seek medical attention when their child or they themselves are severely ill. As a result it can occur that they delay out the visit to a treatment center for so long that the doctors are no longer able to cure the patients. Furthermore, the health centers and public hospitals outside of the capital tend to be understaffed and ill-equipped.[149]

Food security:

Food security is a flexible concept but for the purpose of this thesis the definition adopted by the 1996 World Food Summit in Rome will be used, which goes beyond the mere availability and supply of food.[150] So food security includes the following fundamental elements:

- Availability of food (that it exists)
- Stability of supply (that it exists every day)
- Access to food (that the population can afford to buy food or receive it for free)
- Nutritionally adequate and safe food (that the people not only eat but also nourish themselves sufficiently)

Although Nicaragua is the second poorest country in the Western hemisphere after Haiti, nobody dies of hunger. There is always a way to make money in order to pay for basic food, for example through seasonal migration or through remittances.[151] However, chronic malnutrition due to nutritional deficiencies (lack of vitamins and minerals) is an issue in the dry region, especially in the northern parts of Nicaragua.[152] Ironically, malnutrition is most common where there are many agricultural workers because they have very little income.
The problems of food security in Nicaragua are that there is not enough food in some parts of the country, on the one hand, and that Nicaraguans with slightly higher income have a very unbalanced diet, which includes a lot of sugar and fat, on the other hand. Indeed, studies of World Food Program conducted in Central America show that "nutritional deficiency problems coexist with problems of unbalanced diets and food excesses."[153]

Regarding food security, Baumeister explains that the basic consumption basket for the rural areas is less than that of urban areas.[154] Typically, rural families buy rice, oil, sugar, soap and

[149] Quirós Vísquez, 2011, p.38
[150] http://www.fao.org/docrep/003/w3613e/w3613e00.htm
[151] Interview with María Monge (E2)
[152] Dumazert, 2008
[153] Céspedes, 2010, p.9
[154] Interview with Eduardo Baumeister (E5)

matches. In order to be able to acquire these goods, they are obliged to sell part of their harvest even if they do not produce enough to sustain their families. It is less common for poor rural families to eat fruits and vegetables, which is an expense less but it negatively affects the families' nutritional diet.

Apart from chronic malnutrition, seasonal hunger is an issue in the coffeelands. The small-scale coffee farmers in Matagalpa and Jinotega, for example, only have one income a year after the coffee harvest. Due to the fact that their production is often not profitable and that they are incapable of spreading their income over the whole year, many small farmers struggle to feed their families towards the end of the dry season. This difficult period when many farmers make ends meet by eating less, eating cheaper foods, or borrowing against their future is such a phenomenon it actually has a name, "los meses flacos" (the thin months).[155] Currently, there are initiatives encouraging these small-scale coffee farmers to diversify their crop in order to produce horticulture during the dry season thanks to micro-irrigation.

3.3.2 VARIABLES RELEVANT TO AGRICULTURAL PRODUCTION AND COMMERCIALIZATION

After having assessed the situation of smallholder farmers regarding several socio-economic variables, the focus will now be turned to variables that are relevant to agricultural production and commercialization. The aim is to show why smallholder farmers who could have a lot of potential are unable to realize it due to unfavorable circumstances.

Access to land:

In comparison to other countries, the high access to land of rural families is a positive factor and distinguishes Nicaragua from its neighbors and many other parts of the world. In fact, 79% of the households that dedicate themselves to agricultural activities (those who have family members working in agriculture, be it as producers or permanent or seasonal agricultural workers), have some type of access to land, either as owners or leaseholders on a small scale, independently of whether they also work for a salary in parallel or just produce for themselves with low productivity.[156]

Another factor that distinguishes Nicaragua from its neighbors is the fact that there is no great pressure on the land, even if a certain fragmentation of land exists.[157] The latter tends to occur after the death of the owner when the children each inherit their share of the land. So from

[155] For more information and a documentary on this phenomenon affecting many small coffee farmers visit http://aftertheharvestorg.blogspot.com/
[156] Baumeister, 2009, p.405
[157] Interview with Eduardo Baumeister (E5)

generation to generation, the size of the land is reduced and with it the probability that the family is able to live off the harvest. And yet, the reason pressure on land is not significant is that rural families have fewer children nowadays (an average of under 3 children per woman in 2008 compared to over 6 in the 1970s[158]) and there is more migration towards the city or neighboring countries.[159]

Nonetheless, one has to keep in mind that access to land in itself is not the only issue. One has to consider what kind of land was given to whom. Peter Hach from the US Peace Corps insists that many poor people still do not have easy access to land because they have no other choice but to go to the agricultural frontier where land is still available and cheaper. This often means that the farms are situated on hills, far from markets and other infrastructure etc.[160] As a result the conditions to grow large quantities of quality agricultural products on these lands are inferior and might not be sufficient to make a living off the farm.

One of the findings of this thesis is that most small-scale farmers do not cultivate the totality of their land. So having access to land does not guarantee more cultivation. Of the 50 smallholdings visited, on average 76% of the land area was cultivated. Among the mentioned reasons for not cultivating the entire area were the following:

- The rest not suitable for farming
- Land used as pasture for livestock
- Lack of financial resources
- No cultivation during the dry season

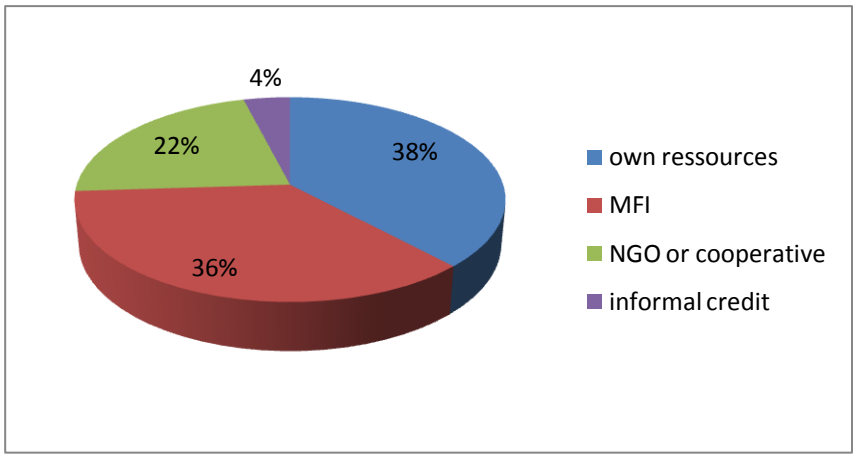
According to María Monge, an expert in rural development, the problem of the rural poor is not access to land but the lack of know-how and technology. She insists that the solution does not lie in achieving a state where everybody cultivates his own land. Salaried workers will always exist in rural areas. What is important is to create the necessary preconditions so these people have a chance to overcome poverty. In this respect, agricultural workers should be paid decent salaries, adequate working conditions need to be introduced and enforced and last but not least, a decent standard of living enabled.[161]

[158] http://www.tradingeconomics.com/nicaragua/fertility-rate-total-births-per-woman-wb-data.html (accessed on 09/04/12)
[159] www.ruralpovertyportal.org/web/guest/country/home/tags/nicaragua (accessed on 11/04/12)
[160] Interview with Peter Hach (E6)
[161] Interview with María Monge (E2)

Financing and access to credit:

Financing is a crucial aspect of farming because a lot of capital needs to be invested up front in order to be able to start cultivating and the income is only generated at the end of the cycle after the harvest. Farmers must either have savings they can use to finance their agricultural activities or they are obliged to find a way to borrow money. Figure 10 shows the different ways smallholder farmers finance their agricultural production.

Figure 10: Financiation of agricultural production by smallholder farmers



Source: own research

Among the farmers visited during the field research the two most common types of financing were to invest their own financial resources if possible and to recur to microfinance institutions if the own savings were insufficient. In this unrepresentative sample the percentage of smallholder farmers with access to credit is much higher than the actual percentage verified in the last published agricultural census of 2001. It reveals that in that year only 15% of farms had access to credit.[162] It is paradoxical that in the 1980s, in the context of civil war and economic blockade, at least 44%[163] of Nicaraguan agricultural producers of all strata had access to credit.

One of the main reasons why access to credit was relatively high until two decades ago was the existence of the National Development Bank, which gave out subsidized credits to smallholder farmers. Since the disappearance of this important credit supplier end of the 1990s, credit to the agricultural sector has become unstable and restrictive for certain sectors, especially to those who have problems presenting real guarantees and property. This has led to complications and has increased the obstacles for a more dynamic reconversion of the rural production sector. [164]

[162] Baumeister, 2009, p.404
[163] Based on CIERA, Vol. IX, table 266 and an estimation of 189.000 producers.
[164] Núñez Soto, 2006b, p.174

It is important to keep in mind that especially smallholder farmers experienced and still experience problems due to lack of rural credit since the National Development Bank went bankrupt. They had grown accustomed to taking credits in order to purchase chemical inputs, seeds and pay themselves a type of salary.[165] Without credits many are unable to afford agricultural input and decided to produce basic grains at low productivity. According to Baumeister, the lack of access to credit is one of the explanations why subsistence farming dominates Nicaraguan agriculture.[166] It is possible to consider it a type of vicious circle of poverty because many poor small farmers only cultivate 1-2Mz of basic grains because they do not have enough livestock to use them as collateral. It is common that they own more land and could be able to cultivate 3-4Mz, for example, but they do not have the capital to do so. This is a fundamental point when it comes to poverty in Nicaragua. Smallholder farmers here might very well have land that smallholder farmers in other parts of the world only dream of, yet they are not able to take advantage of it.
After having explained why the disappearance of the National Development Bank had negative repercussions on access to credit for small famers, a closer look at the current credit providers will be taken.

In general, banks prefer giving out loans for commercial activities and are more reluctant to lend to the agricultural sector because they do not want to take the risk of not being reimbursed in the event of a bad harvest. The agricultural sector is very vulnerable to weather conditions (droughts or excessive rainfall) and plagues, both of which can cause the loss of an entire harvest. In 2004 and 2005, for example, of the commercial credits granted, less than 5% were destined to finance agricultural production.[167] Exceptions are made for big farmer or companies. Indeed, 77% of the credits granted by commercial banks to the agriculture consisted in transactions of big companies trading in coffee, sugar, sesame, peanuts, etc.[168] Smallholder farmers are the ones who are categorically excluded from the official channel of getting a credit from commercial banks which offer the lowest interest rates. They are the ones most affected by the credit supply through the market of commercial banks because the majority of them cannot fulfill the established requirements.[169]

Therefore, the only options smallholder farmers have to borrow money are through cooperatives, microfinance institutions (MFIs) or moneylenders. All of these options charge very high interest rates, which can be dissuasive. Although MFIs are filling the gap left by the State

[165] Baumeister, 2009, p.409
[166] Interview with Eduardo Baumeister
[167] Núñez Soto, 2006b, p.176
[168] Núñez Soto, 2006b, p.176
[169] Núñez Soto, 2006b, p.174

and commercial banks, financing of the agricultural sector is still insufficient in general and critical for small-scale farmers in particular. Among the main obstacles preventing poor smallholder farmers from getting access to microfinance in Nicaragua is the necessity for clients to provide collateral in order to be granted a loan, the high interest rates charged by the MFIs, the scarce availability of microfinance services in remote rural areas and the lack of comprehensive solutions combining financial products with agronomic and technical advice.[170] Indeed, access to credit is often undermined if the credit seeker does not have the official title over the land. In Nicaragua, one can have the unofficial right over the land but as long as the owner is not included in the official registry, he does not have the full rights over his property. Most of the time MFIs insist that the farmer wanting to take out a loan put his house or farm down as collateral, which is only possible if he is in fact the official owner. Marlin Sánchez, who works for a big MFI, stresses that access to credit depends on the client's repayment capacity and not on the legal situation of the land. Even so, most poor farmers are excluded from this option because they do not have the required collateral (i.e. many cows or a motorbike).[171]

But even those who do manage to take out a loan often face difficulties. As briefly mentioned earlier, the interest rates charged on the loan are very high. Freddy Ruiz who used to work in the microfinance sector himself for several years is convinced MFIs do not have the well-being of poor farmers at heart but are only interested in their own profit.[172] Francisco Zamora shares this view, arguing that many MFIs receive significant amounts of capital from international donors who want to improve the access to credit for small farmers.[173] This means that the MFIs have no initial cost of having to procure the capital they will lend and as a result the interest rates could be lower than they currently are.[174] In light of such high interest rates many smallholder farmers struggle to keep up with their repayments. During the field visits, several small-scale farmers mentioned they could hardly sleep at night because the debt had become such a burden. Another problem many farmers face is that the credits are usually given over a short period. The payment is due right after the harvest, which is why the farmer is forced to sell his harvest immediately and cannot wait for a better moment when the price is higher. The short repayment period is also riskier because the farmer does not have the possibility to compensate a bad harvest with a better one the following year. In addition to giving farmers more flexibility, long term loans would allow farmers to purchase livestock or make investments on their farm.

[170] Stauffer, 2011, p.31
[171] Interview with Marlin Sánchez (E1)
[172] Interview with Freddy Ruíz (E4)
[173] See also Spalding, 2009, p.375
[174] Interview with Francisco Zamora (E7)

Despite the insufficient access to credit smallholder farmers produce because they find ways to make money by selling eggs or tortillas among other things. According to María Monge financing is not the most important issue. She stresses the necessity of knowing how to use the financing appropriately. If the smallholder farmer lacks the necessary know-how and techniques to cultivate his land successfully, he runs the risk of seriously indebting himself in the event the harvest does not bring the expected results.[175] This was indeed the case with some of the smallholder farmers visited during the research. Don Mauricio (F3) and his neighbor admitted that they did not even know the exact amount of their loan and that they had not been aware of the risk involved. Now, they are struggling to pay off their debt after the harvest turned out to be less profitable than anticipated.[176]

Access to agricultural input and seeds:

Agricultural input, which includes seeds and agrochemicals such as fertilizer and pesticides are important elements to ensure agricultural production and increase productivity. Therefore, many farmers spend a large part of their resources on agricultural input. The majority of poor smallholder farmers cannot afford them but they try to find ways of acquiring them by borrowing, sharing or improvising.

In the unrepresentative sample, 42% of the visited smallholder farmers buy or receive certified seeds, whereas the vast majority (58%) uses seeds from the previous harvest.

One of the biggest investments smallholder farmers make is buying fertilizer, representing between 35-45% of production costs.[177] Indeed, 37 out of the 50 smallholder farmers (74%) invest in fertilizer because it is necessary to increase nutrients in the soil and plants. Organic fertilizer is common, too, because it is cheaper and can be sold to other farmers in the community.

Furthermore, the fear of losing crops due to plagues and infestations is omnipresent, which is why all farmers, big and small, are concerned about pesticides. This also explains why most Nicaraguan farmers tend to apply pesticides or fungicides excessively and often erroneously think that more is better.[178] Over half of the smallholder farmers visited (54%) purchase chemical pesticides to fight plagues, 36% improvised organic pesticides such as ashes, vinegar, etc. although the effectiveness is inferior and only 10% did not use any type of pesticides at all.

[175] Interview with María Monge (E2)
[176] High cost of fertilizers and pesticides shrunk their profits to a minimum or even outweighed their income.
[177] Interview with Justo Pastor Torres (E8)
[178] Interview with Justo Pastor Torres (E8)

Access to technology and good agricultural practices

Technology is largely absent from the Nicaraguan agriculture sector. Only 10% of the small farms visited could pass as semi-technified.[179] The vast majority were very traditional with only rudimentary tools being used. This is one element that explains why the productivity of Nicaraguan producers is the lowest in Central America. Obviously, the relative abundance of land is another reason because until now farmers did not feel the necessity to intensify their production. "The way in which farming is practiced in Nicaragua today resembles that of the 1850s in the USA."[180] Especially smallholder farmers follow a certain historic logic by cultivating their land like it was done hundreds of years ago, even if many techniques are far from being good agricultural practices. For example, most do not practice crop rotation, which would improve the soil and mitigate the build-up of plagues.[181]

One reason is that there is little knowledge of technology among small-scale farmers. Peter Hach stresses that these groups of producers "do a great job considering the lack of resources."[182] The problem arises when it comes to new technology. Either they do not know it exists or they do not know how to use it.[183] The low technical knowledge also refers to not knowing how to identify soil needs, plagues etc.

After the revolution in 1979 until today, there have been several attempts to modernize agriculture and to introduce more modern technology. However, they have not been successful. One problem is that the programs are not very sustainable. Usually the projects consist in distributing quality seeds, other agricultural input such as fertilizers, or equipment at one point in time. Yet, when the next season approaches, smallholder farmers often do not have the necessary capital to maintain the use of these techniques. Another factor is that many farmers began planting basic grains once they received land in the 1980s, crops that typically do not require a lot of input or advances agricultural techniques.

Another point worth mentioning regarding technology is that "most small farmers do not give a lot of importance to modernizing their farms and agricultural practices."[184] Investing in tractors or other tools is not a priority. Rather, a common aspiration among farmers is to have more cattle because a cow is a form of savings. In addition, it is capital that reproduces itself without a lot of effort having to be put in on behalf of the farmer.

[179] On a technified farms all available technology is used in order to achieve efficiency in production, e.g. applying agrarian best practicies, using fertilizers, irrigation etc.
[180] Interview with Peter Hach (E6)
[181] Interview with Justo Pastor Torres (E8)
[182] Interview with Peter Hach (E6)
[183] Interview with Peter Hach (E6)
[184] Interview with Eduardo Baumeister (E5)

Destination of the harvest, infrastructure and market access:

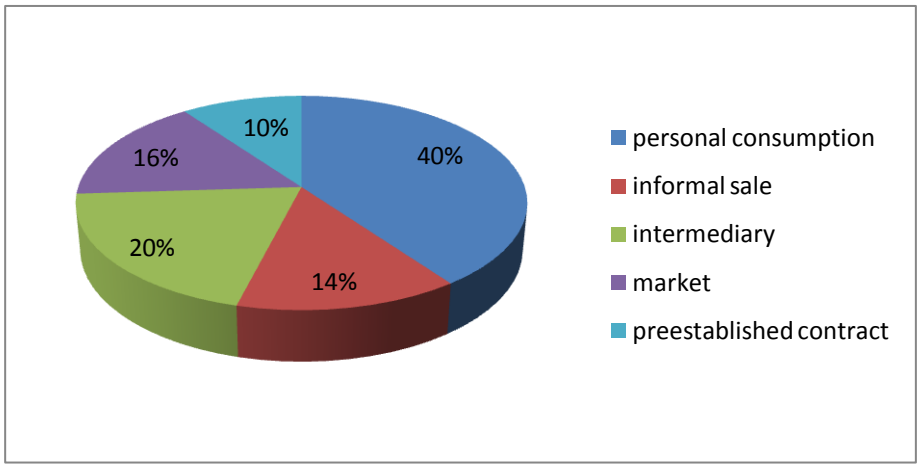
Destinations of the harvest

When it comes to the destination of the harvest there are several options:

- personal consumption
- informal sales
- sales to intermediaries or in markets
- pre-established contract with supermarkets or other agribusinesses

These different options can be used to distinguish different types of smallholder farmers although one has to keep in mind that it is possible for the same farmer to opt for several of the mentioned alternatives at once. Figure 11 shows the different destinations of the harvest produced by the smallholder farmers visited during the field research.

Figure 11: Destination of the harvest produced by smallholder farmers



Source: own research

The majority (40%) were subsistence farmers who use the harvest first and foremost for the family's personal consumption. Part of the harvest has to be sold to be able to purchase food and other basic goods that are not produced on the farm. Climate variation, plagues and insufficient know-how are some of the main reasons subsistence farmers are not able to produce enough to be able to sell the remaining harvest.

A second group of smallholder farmers (14%) is able to produce a surplus, which they sell informally among their neighbors in the community or they sell it to the local market. Many smallholder farmers go to the market individually and look for a vendor.

Among the commercializing smallholder farmers, it is common to sell the harvest to an inter-

mediary who picks up the harvest directly from the farm. This was the preferred option for 20% of the smallholder farmers visited. The problem for the farmer is that he has very little negotiating power and is often forced to accept the low price of the intermediary because the latter can easily go to another farm. Furthermore, the intermediaries act like an organized group fixing prices at a very low level – the word "mafia" was employed by various experts.[185] The farmer on the other hand has little information about commodity prices and rarely goes to town to find out beforehand. Also, most farmers are eager to find somebody who will buy their harvest because they urgently need money, which explains why many take the first opportunity that arises to sell. The system of selling directly at the source is important because the vast majority of farmers do not have the capacity to store and transport their harvests themselves. Buying the necessary boxes, organizing a truck and spending on gas is simply too expensive.[186]

The other group of commercializing smallholder farmers, especially those in peri-urban areas, sells the produce to big urban markets (16%), to supermarkets or other agribusinesses (10%). These smallholder farmers are part of a value chain, even if they are at the very bottom of it. Farmers producing horticulture who enter the supermarket supply chain benefit from the insurance the contract provides against the significant price volatility in traditional markets.[187] However, Michelson et al. (2010) also found out that the locations, from which supermarket procure their supply, is strongly determined by the communities' access to roads, markets and year-round water. Furthermore, the exit rate of smallholder farmers is very high.

Low income for harvest

Regardless of the destination of the harvest, small-scale farmers generally struggle with the low prices they get for their harvest. The main problem is the high competition among farmers during certain periods. In Nicaragua farmers all tend to cultivate popular crops at the same time. The vast majority of farmers do not cultivate strategically so as to harvest when overall supply is low. One obvious reason for not doing so is that cultivation is not possible during the dry season without irrigation. By taking advantage of these marketing windows by producing anti-cyclically, smallholder farmers could improve their income, which is why low cost drip irrigation systems have such a high potential as will be explained in more detail in chapter 5.

Another reason they only receive very little for their harvest is that they are at the very bottom of the productive value chain. As mentioned in subchapter 3.1, they sell the product in a very basic state and do not do anything to increase its value.

185 Interviews with Freddy Ruiz(E4), Educardo Baumeister(E5), Francisco Zamora (E7) and Justo Pastor (E8)
186 Interview with Justo Pastor Torres (E8)
187 Michelson, Reardon, & Perez, 2010

The role of infrastructure

Speaking of market access, one inevitably has to mention the state of infrastructure, which is one of the determining factors for good or bad market access. Indeed, infrastructure is a critical means to develop links between poor rural communities and the outside world by reducing physical costs within agricultural economies and by improving the competitiveness of rural producers.[188] In 1982 the president of one of the most important farmer co-operatives, UNAG, voiced his concern about the lack of infrastructure. Twenty years later many agricultural producers, especially smallholder farmers still face serious "problems marketing the products because at times the zones are very isolated and there are no roads to take out the harvest. Products have to be sent out by mule or on horseback, or by water."[189] More recent data from CIPRES reveals that hardly 32.4% of farms in Nicaragua have an appropriate level of access to infrastructure in terms of roads and bridges that are passable during all weather conditions. This is a structural condition defining the path of small production in the countryside.[190]

Related to insufficient infrastructure, public transportation also remains a problem for many small-scale producers because there are only very few busses a day - if any - and poorest among the smallholder farmers cannot afford the bus fare. During the data collection phase it did occur to have to hike for an hour to get from one farm to the other, keeping in mind that there are countless other farms that are even more secluded.

Diversification:

Diversification means that several different types of crops are produced on a farm or that the household broadens its sources of income by raising poultry or other farm animals in addition to cultivating food crops.

Traditionally most smallholder farmers produce basic grains. By producing a variety of different crops they could reduce the risk of losing the entire crop in the case of a severe infestation of plagues that attack a certain crop type. Diversifying by producing horticulture in addition to their main crop can also provide better nutrition for the family and represent an extra source of income because fruits and vegetables are sold at higher prices than basic grains. Despite these advantages the majority of small-scale farmers refrain from cultivating horticulture because the production of fruits and vegetables requires more intensive care and that the harvest cannot be stored. If the farmer does not see the benefits quickly, he will not bother diversifying.[191]

[188] Tango International, 2009, p.33
[189] Ariel Bucadso of UNAG in 1982 interview: http://www.envio.org.ni/articulo/3273 (accessed 22/03/2012)
[190] Núñez Soto, 2006b, p.236
[191] Interview with Freddy Ruíz (E4)

With few exceptions, the production of horticulture (e.g. tomato, green pepper, pumpkin and squash) was a new experience for the majority of smallholder farmers visited.[192] One of the main obstacles in producing horticulture is controlling plagues (insects and fungal diseases). Indeed, many smallholder farmers pointed out that coping with plagues was an enormous challenge and limited the increase of production.

4. ASPIRATIONS OF SMALLHOLDER FARMERS

After having identified the relatively objective characteristics of smallholder farmers in Nicaragua regarding their socio-economic situation as well as in terms of variables that are important for them to succeed as agricultural producers, this section is dedicated to the more subjective, personal characteristics of smallholder farmers in order to get a deeper understanding of their aspirations, needs and perceptions. As outlined in section 1.2 the methodology used were ten in-depth interviews with iDEal customers who are in possession of a micro-irrigation system. The Human Centered Design (HCD) toolkit provided a guideline for the semi-structured interviews and especially the aspiration cards were an excellent support. To explain the latter, the exercise consisted in asking the participant to look at the various cards that depicted different situations (i.e. different types of activities), objects (house, TV, books, car, animals etc.) and to pick the three images that best reflected their aspirations for the future. Once having selected the cards they were encouraged to explain what the image represented for them and why they had chosen the card. The images are open to interpretation and can be taken for whatever the observer wants them to represent. They are merely a visual support in order to make the interview more interactive and interesting. Other HCD tools included worksheets to understand the resource flow of the household and perceptions of the drivers and barriers to the person's prosperity[193]. Obviously, the toolkit was just a starting point and was built upon with further questions, which encouraged the interviewee to share as much about his personal story as possible.

4.1 THE CAPACITY TO ASPIRE

The Oxford dictionary defines 'aspirations' as hopes or ambitions of achieving something. At first thought it would seem plausible that everybody has future plans, hopes, goals or targets, regardless of their socio-economic background. However, one of the main findings of the in

[192] As customers of IDEal Tecnologías they had access to drip irrigation systems and many of them used it to grow horticulture.
[193] This exercise was abandoned in the end because it was not well received by the large majority of farmers.

depth interviews is that many smallholder farmers had extreme difficulties expressing their aspirations.

Difficulties to identify and express aspirations

Some were overwhelmed by the question at first and did not seem able to identify any aspirations for the future. Not even looking through the stack of aspiration cards with different types of images seemed to inspire any ideas. Doña Juana's (F1) husband who was included in the interview of this wife, for example, even had difficulties recognizing several of the pictures and seemed unable to grasp the essence of the inquiry despite repeated explanations. With some hints - though this is supposed to be avoided by the researcher under normal circumstances - he agreed with some of the common aspirations among farmers, i.e. having more land and livestock. Yet it appears unsure, whether he actually hopes of achieving these goals one day or whether it is just wishful thinking to him given his precarious financial situation. One possible explanation for these reactions by several of the participants could be that nobody had ever asked them about their aspirations before and so they were taken by surprise. This would imply that they had not given their desires for the future a lot of thought in private either, which could have facilitated giving an answer.

Inability to project oneself into the future

The inability to project themselves into the future was indeed a reoccurring impression during the interviews. In numerous instances, when asked about their hopes and dreams for the future, the participant mentioned aspects or activities he or she liked about the present, i.e. continue cultivating their field. Of course one could argue that certain present features are so important and to the liking of the person that the individual does not want to see any change in this respect. In the case of Doña Sofía (S2), for example, the possibility of growing two vegetable gardens significantly changed her life. Before, she used to work as a domestic employee, having been paid little for the hard work and being treated badly. Today, she is more independent, enjoys seeing the results of her work and has the sense of providing for her family better (e.g. through a more balanced nutrition). According to her, this gives her a great amount of satisfaction and improved her self-esteem. In light of this, it is understandable that her aspirations reflect the positive aspects of her present situation.

Nonetheless, there was neither a sign of having previously thought about the future nor of aspiring for something more. It has to be noted that this woman neither has electricity nor water in her house and is forced to walk a total of four hours every single day to fetch drinking water

for her family. So it is not as if her life was so comfortable and fulfilling in every respect that there would not be anything worth improving. Rather, it did seem difficult for her to project herself into the future and there was a sense that it had never occurred to her that having water and electricity at home could be an option. In fact, psychological research has shown that "people in prolonged states of deprivation show relatively low aspiration levels, with their goals focusing largely on the immediacy of subsistence." [194]

Doña Sofía was by far not the only participant who had initial difficulties expressing her aspirations but as with the others some underlying aspirations could be identified during the course of the conversation using a more indirect approach. So, one cannot say that smallholder farmers interviewed did not have any needs or were not aware of their difficulties. However, the initial supposition that everybody is aware of his aspirations, can communicate them easily and has some kind of action plan of achieving their goals eventually has to be revised.

Explaining the findings through aspiration theory

This experience is not all that surprising if one supposes that there is something like a capacity to aspire, which needs to be acquired and practiced in order to be managed. The capacity to aspire is a concept developed by the Indian anthropologist Appadurai (2004) and taken up by a few economists such as Ray (2006) or Heifetz & Minelli (2006). Appadurai establishes that aspirations are a future-oriented cultural capacity and as such derive from cultural norms.[195] Economic aspects of aspirations are usually expressed through wants, needs, expectations and calculations. But Appadurai points out that "aspirations are never simply individual (as the language of wants and choices inclines us to think). They are always formed in interaction and in the thick of social life."[196] So a person's behavior is conditioned by the experiences of other individuals in the cognitive neighborhood of that person.

Factors influencing aspirations

While Appadurai himself remains rather vague about who in a person's neighborhood is likely to have an influence on one's aspirations, the economist Ray fleshes out the argument by introducing the notion of an aspiration window. This is a zone of similar, attainable individuals, whose lives, achievements, or ideals influence the aspirations of others.[197] According to Ray there are several factors that determine this aspiration window.

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[194] Chakravarti, 2006, p.368
[195] Appadurai, 2004, p.1
[196] Appadurai, 2004, p.10
[197] Ray, 2006, p.409

1. Individuals use their peers or near-peers as a reference. Celebrities whose life style is too disconnected from the average person, for example, are not considered realistic benchmarks.
2. There are restrictions regarding the flow of information. There are limits to what people can observe or what can be communicated. For instance, if successful individuals leave the community they no longer influence the aspirations of others as much.
3. The aspiration window is determined by econometric reasons. Ray explains that "looking at experiences of individuals similar to [the person in question] is like running an experiment with better controls."[198] And as such it provides a good basis to make informed decisions.
4. The notion of 'similarity' is contextual because the width of the aspiration window depends on how much mobility (or perceived mobility) there is in a society. "The greater the extent of (perceived) mobility, the broader the aspiration window." [199]

The idea that a person's aspirations derive from his or her social environment is important in the context of poverty because in many rural communities poor families are surrounded by neighbors who live under equally difficult conditions and so the shared experiences are not likely to lead to positive synergy. This could be one element to explain why several poor small-scale farmers had a limited aspiration horizon.

The poor lack the capacity to aspire

Another part of the explanation can be found in the assumption that the poor lack the capacity to aspire. In addition to being the result of social interactions, Appadurai furthermore asserts that "aspirations about the good life, about health and happiness exist in all societies." [200] They are part of a system of ideas made up of three levels:[201]

1. a visible inventory of wants
2. intermediate local norms
3. higher order of normative contexts or a larger 'map' of ideas and beliefs

The capacity to aspire requires to be aware of the different levels of aspirations and how they interact. Someone who has the capacity to aspire is able to make the connection between their wants and goals and possible ways of achieving them. This is exactly what many – not to say most – smallholder farmers interviewed were not able to do. They had difficulties expressing

[198] Ray, 2006, p.410
[199] Ray, 2006, p.411
[200] Appadurai, 2004, p.10
[201] Appadurai, 2004, p.10

their aspirations, projecting themselves into the future and naming the possible options of achieving their aspirations.

Appadurai provides an explanation by emphasizing that the capacity to aspire is not distributed equally in society. Indeed, "the better off you are (power, dignity, material resources), the more likely you are to be conscious of the links between the more or less immediate objects of aspirations."[202] This means that they understand the relationship of aspirations and the possible pathways made up of alternative options to achieve them. Or put differently, they grasp the broader context by connecting ends and means and therefore learn what the easiest and most efficient paths are to fulfill their aspirations. The reason the more privileged in any society are more successful in reaching their aspirations is that they "have used the map of its norms to explore the future more frequently and more realistically" and that they "share this knowledge with one another more routinely than their poorer and weaker neighbors." [203]

In contrast, the latter lack opportunities to practice the use of this navigational capacity because their situations permit fewer experiments and less archiving of alternative futures. As a result they have "a more brittle horizon of aspirations."[204] Thus, the capacity to aspire requires practice and as Chakravarti (2006) argues, when a capacity or decision making process is not refined through practice it falters and often fails. Indeed, psychological research confirms that the unstable life of poverty often limits the poors' aspiration levels to those of necessity, such as having food to feed ones family.[205] At the same time, lower aspiration levels are reinforced because someone who is busy studying, instead of looking for ways to get enough food, will not survive long in the poverty environment.

Education as a facilitator

After having given some explanations as to why many of the smallholder farmers interviewed had difficulties expressing their aspiration, it should be clarified that this was not the case with all participants. Although the number of in-depth interviews is too small to draw any definite conclusions, it seems that the educational level had a positive effect on the ability to identify and express aspirations.

Indeed, the only people who knew exactly what they wanted for the future were two female teachers, Doña Marina in Estelí (S1) and Doña Reyna in Somotillo (S5) and Don Panfilo in San Lorenzo (S4) who had gone to university. The three of them not only identified their aspirations

[202] Appadurai, 2004, p.11
[203] Appadurai, 2004, p.12
[204] Appadurai, 2004, p.12
[205] Chakravarti, 2006, p.368

with ease but they could also explain why and in which order they aspired to their respective goals. Doña Marina even described how her three aspirations, namely cultivating vegetables, sharing her general knowledge and specific know-how, and setting up a small market in her community in the more distant future were all inter-related. These experiences seem to confirm that "education stimulates voice, enhances communication, and imparts a sense of empowerment and self-determination […]"[206]

Nonetheless, in the case of all participants any type of action plans to achieving their aspirations were either completely absent or very vague, which would confirm Appadurai's claim that the poor do not have enough possibilities to practice their capacity to aspire.

4.2 ASPIRATIONS OF SMALLHOLDER FARMERS

Despite the fact that many participants had difficulties expressing their aspirations, it was possible to extract information of what was important to them or what would improve their livelihood. Many also revealed their aspirations indirectly during the conversation.

The most common aspirations mentioned by the small farmers interviewed can be grouped into the following main categories: education, more productive farming, an improved standard of living, setting up a small business, paying off their debt and helping their community. The first three were mentioned systematically, whereas the last three only came up in a few conversations.

1. Education

Education was one of the most frequently mentioned aspirations, especially among the female participants. In most cases they gave a lot of importance to the education of their children in the hope of giving them a chance at a better life. Several of the participants only went to school themselves for a few years because their families were very poor but they consider it a sacrifice worth making for their own children. Indeed, sending their children to school or university represents a certain financial burden because of the inscription fees, books, clothing and bus fare for example. In the long run, everybody seems to understand that education is key to having the possibility of a better future. There was a sense that many smallholder farmers wanted their children to find professions outside farming. One mother wanted her daughter to become a doctor, for instance.

Other aspirations regarding education were voiced by a few who would like to learn how to read and write themselves or acquire additional skills. A teacher expressed her wish to learn how to

[206] Chakravarti, 2006, p.365

use the computer because she wants to be up to date and anticipates that having these skills in the future will be vital for her job.

Last but not least, education was an aspiration for those who were working in the field. Both women and men acknowledged that they had some deficits concerning agricultural know-how and would like to learn more about cultivating certain crops, identifying and eliminating plagues, and increasing overall productivity. This shows that not all small farmers who use very basic traditional techniques are close-minded and resistant to change. On the contrary, some are more than willing to learn about good agricultural practices if they had the chance.

2. Farming

Given that the interviewed all live from agriculture one way or the other, it is not surprising that many aspirations concerned their farm and agricultural production. For a majority of smallholder farmers their main hope for the future is to continue cultivating and to make a living from agriculture. The importance given to agriculture was also revealed by the fact that several participants chose two out of three cards representing more or less the same thing, e.g. a person sowing or harvesting, which both falls under cultivation.

Among the most common aspirations was the wish to increase the area under cultivation. Either they hoped to be able to cultivate the parts of their own land that lay barren due to lack of capital or to rent land from somebody else. For several small-scale farmers access to land was still an issue because the area they currently cultivate does not produce enough to live from the harvest alone.

Another aspiration mentioned repeatedly was the desire to have more livestock. In fact, dairy cows are very popular for several reasons. They do not require a lot of maintenance because nature provides for them, in the sense that they graze independently and they do not require a lot of medication. The benefit of owning cows is that they produce milk, of which other dairy products can be made as well. So cows are a source of income and insurance in case of an emergency because they can be sold. Don Rider (S6) explains that a cow is a lot more resistant to the weather and plagues than crops and is therefore a more stable source of income. Indeed if a farmer has enough cows, he can sell the milk, meat or the calves.

Some smallholder farmers also mentioned that they would like to purchase a bigger micro-irrigation system because they were pleased with the results in the small area under irrigation. Another farmer would like to have his own motor instead of having to borrow his brother's, which leads to the third theme of aspirations regarding improved living standards.

3. improved living standard

Apart from education and more productive farming, the third reoccurring theme among aspirations was standard of living. In numerous instances, the participants voiced their desire to improve their housing, either by expanding the house or by improving its quality. Having more rooms and walls made out of bricks instead of wood, for example seemed important not just for the comfort of the family but also with regard to their neighbors. It seems that it is very important to many what the others in their community think. Other aspirations of the material type included having more chairs or kitchen utensils.

Especially in more remote areas obtaining a mode of transportation was another aspiration aiming at increasing one's quality of life. Several smallholder farmers mentioned that having a horse would save a lot of time and make selling their harvest in the local market a lot easier. Others who have to commute regularly between their farm and town would rather opt for a motorcycle, which would save a lot of time for work and in the case of emergencies. Currently it is not rare that they have to walk for hours every morning and evening.

Having water and electricity at home was not cited as one of the priorities. But Doña Sofía admitted that having a drinkable water source at home would significantly improve her life because she would have four hours she could dedicate to something else instead of fetching water. One reason is that some of the poor are used to it and have structured their daily activities around the hours there is sunlight and another could be that this is seen as something that is outside of their control.

4. set up a small off-farm business

Although many of the small-scale farmers visited were subsistence farmers, several aspire to start commercializing their harvest in the future. Initially, they just want to produce more to be able to sell the surplus in their community.

During the conversations it became clear that some of the smallholder farmers would actually like to diversify their sources of income or even make a living outside agriculture. One example is setting up a small business not related to their agricultural production, in the form of a shop in their house. And one of the participants who is an agronomist dreams of having his own agrochemical store one day. Don Felix (F4)'s aspirations lead to the conclusion that he actually does not want to be a farmer at all. Although he has invested a lot into his current plantain crop, all of his aspirations involve different means of earning money. He would like to acquire a motortaxi to improve his capacity as a vendor or a car to become a taxi driver. He sees potential in this

occupation because the people in his community have to walk a long distance to reach the main road and nobody else is currently providing this service.

5. pay off debt

Some of the farmers interviewed had taken up a credit in the previous season and were struggling to pay off their debt and interests because the heavy rains had destroyed a big part of their harvest. For some the financial burden and psychological effects of worrying about how to make ends meet were so overwhelming, it became their main concern and only priority. One of the possible strategies Don Mauricio (F3) is considering to solve his problem is to temporarily work on a rice plantation in Costa Rica, where he would be paid a higher salary and thus could repay his debt faster.

6. help the community

While the grad majority of participants mentioned aspirations that aimed at improving their lives or those of their children, two women had a strong desire to help the people in their community. As a teacher Doña Marina (S1) feels it is her vocation to transmit her knowledge to others. She would love to teach the people in her neighborhood to read and write because many of them are illiterate. Furthermore, she would like to form a group of women to show them how to grow a vegetable garden or how to do simple arts and crafts in order to sell their products in the community. Doña Reyna's (S5) first ambition is also of a social nature. She is hoping for a good vegetable harvest this year so that she can sell her surplus in the community at a lower price than the market price. This way she hopes to make fruits and vegetables more accessible to many poor households in her surroundings. Indeed, most rural households hardly include fruits and vegetables in their diet and the market in Somotillo is a one hour bus ride away.

5. CASE STUDY: FACTORS DETERMINING THE SUCCESS OR FAILURE OF POOR MICRO-IRRIGATION USERS

After having investigated the socio-economic conditions and other agricultural characteristics of smallholder farmers on the one hand and their aspirations on the other hand, the acquired insights shall now be applied to a concrete case study. The aim is to identify factors determining the success or failure of poor micro-irrigation users in Nicaragua. In the first step the drip irrigation technology is presented and its potential contribution to poverty reduction explained.

5.1 DRIP IRRIGATION AND ITS POTENTIAL FOR SMALLHOLDER FARMERS

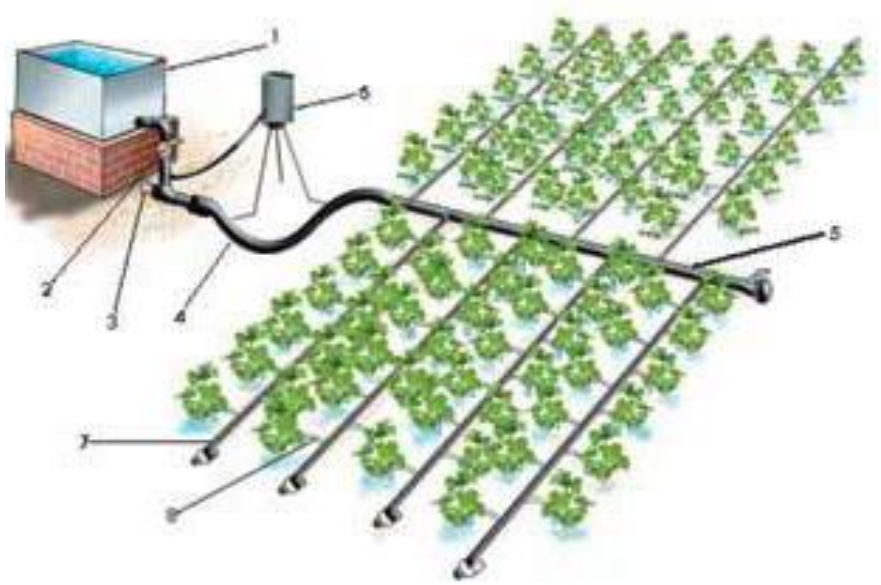
5.1.1 LOW-COST DRIP IRRIGATION MADE BY IDE

Water scarcity has become a major global concern. The agricultural sector in particular has an important role to play in promoting sustainable water management given that it is responsible for 70% of all fresh water withdrawals globally.[207] Among those most affected by water scarcity are the rural poor in developing countries, especially small-scale farmers, for whom "access to irrigation water provides a substantial productivity gain and increase in food production."[208] Often there is not enough water available for irrigation and as a result many farmers are forced to reduce or stop cultivation. For many smallholder farmers this has significant negative consequences on their daily lives because agricultural production represents their main source of income.

The traditional and most common method to water the fields is flood irrigation, which requires enormous amounts of water. What is more, a big part of the water used is wasted because the roots cannot absorb all of it. Hence, the necessity of developing water saving technologies. Drip irrigation provides farmers the most efficient way to grow crops in water scarce areas. Indeed, "in drip irrigation systems, water flows through plastic pipes laid across the field and is applied directly at the root of plants through drippers. [...] It also inhibits the growth of weeds in the fields by restricting water supply to intended plants, thus leading to substantial savings of labor and expenses on inter-culture.[209] [210] Additionally, drip systems save energy as more area or plants can be irrigated in a short span of time compared to flood irrigation." Because drip irrigation has historically been too expensive for small-plot farmers, the international NGO International Development Enterprises (IDE) modified commercial drip irrigation systems to come up with its own simplified design for small farmers, which only costs a fraction. These systems provide water savings of 30-70%, greatly reduce labor, and accurately deliver fertilizers. This makes cultivation during the dry season possible, with resulting yield increases of up to 30%.[211] Figure 12 illustrates such a low-cost drip irrigation system.

[207] FAO, 2007, p.3
[208] http://www.ideorg.org/OurMethod/Water.aspx
[209] simultaneous growing of a second crop between the rows of the main crop
[210] IDE (dateless), p.3
[211] www.ideorg.org

Figure 12: IDE's low-cost drip irrigation system



Source: International Development Enterprises

In Central America, IDE is taking a market oriented approach to disseminate their irrigation technology among farmers. According to this model micro-irrigation systems are sold to customers as opposed to giving them away for free. The social enterprise IDEal Tecnologías adopted IDE's micro-irrigation systems and its social mission of improving the livelihood of smallholder farmers but it is set to becoming financially self-sufficient in the future. However, it has to be mentioned that in the initial stages, IDEal Tecnologías entered several strategic alliances with NGOs and local cooperatives that buy the products from IDEal but then give them away for free to social project beneficiaries. This explains why the majority of small-scale farmers interviewed during the field study for this thesis did not pay for the drip irrigation system or the treadle pumps themselves. It is important to keep this fact in mind when interpreting the research results of the factors influencing the success or failure of micro-irrigation users. Before discussing the research results, however, the next sub-section will highlight the potential of micro-irrigation, which could have a positive impact on the lives of the rural poor. This will allow the reader to better understand the importance of identifying the barriers keeping small farmers from adopting the technology.

5.1.2 THE POTENTIAL OF MICRO-IRRIGATION FOR POVERTY ALLEVIATION

Micro-irrigation systems could substantially improve the standards of living for poor farmers. However these systems need to be simple and low-cost so that poor producers with little

education, skills and financial capacity can access them. Once these requirements are met, micro-irrigation systems have the following advantages:

First of all, low-cost drip irrigation systems give small-scale producers the chance to increase their incomes. Several IDE studies show that micro-irrigation leads to significantly higher yields in beans, many types of vegetables like tomatoes or peppers, and a range of other high value crops such as plantain, coffee or cocoa. Indeed, in comparison to traditional irrigation methods, drip micro-irrigation allows for a yield increase of 30%[212]. Furthermore, income can be increased by making it possible for farmers to grow crops during the dry season, when fields usually lay barren due to lack of water. This allows an additional harvest per year for many vegetables.

Second, micro-irrigation systems improve food security by reducing the dependency on climate and by thus providing agricultural revenue for small-scale producers all year round. For instance, IDE and IDEal Tecnologías offer a 20m^2-sized family kit suitable for vegetable gardens. This allows rural households to produce for their own consumption and therefore improve their food security. At the same time it improves the family's diet through a higher consumption of vegetables, since micro-irrigation is often used to produce horticultures due to their shorter growing cycles.[213] Indeed, the common diet in the Nicaraguan countryside is based on corn tortillas and red beans. In order to guarantee the rural families' food situation, it is important for them to strike a balance between personal consumption and generating cash income from selling the produce.

Third, micro-irrigation can improve the access to market by increasing the competitiveness of small-scale producers. According to IDE (2010b), a growing number of smallholder farmers have to produce crops when the market demands it: micro-irrigation allows selling to super-markets or exporting high-value crops within a rigid crop schedule, which strengthens the position of smallholder farmers in the value chain. Also with regards to an improved access to market, Zbinden and Pong (2005) point out the possibility to produce anti-cyclically to fluctuations of market prices and to grow crops of high seasonal commercial value.[214] Besides, the participation in high-value vegetable markets is also facilitated by the possible delivery of fertilizers directly to the roots of the plant.[215]

Forth, Zbinden and Pong point out a reduced risk of contamination of family members and of the environment through inadequate agrochemical practices since micro-irrigation systems

[212] www.ideorg.org
[213] Zbinden & Pong, 2005, p.17
[214] Zbinden & Pong, 2005, p.35
[215] IDE, 2010

deliver fertilizers to plants in the exact needed quantity.[216] Furthermore, it reduces the propensity of the plants to be infested by insects, fungi or bacteria because there is not too much humidity in the form of standing water as is the case with flood irrigation.[217] Also, during the dry season pests are less of a problem in general. Thus, drip irrigation lowers the risk of losing the crop and reduces the need to apply excessive amounts of pesticides.

Fifth, micro-irrigation is positive for the social life of rural families because it does not require finding work outside the farm during the dry season.[218] During the field visits several customers, especially women, mentioned that the ability to provide for their family better gives them more self-confidence.

Last but not least, micro-irrigation improves the overall water footprint. Indeed, water is used more efficiently since micro-irrigation systems apply water only on spots where the plant is growing. For instance the consumption of water for banana plants in Nicaragua has been reduced by half.[219] As already mentioned, generally water saving from 30-70% can be reached.

In light of these advantages, it seems obvious that drip irrigation has an enormous potential to improve the living standards of smallholder farmers and thus to reduce rural poverty. However, for this potential to be unleashed such drip irrigation technology has to be made accessible to poor rural household, on the one hand, and be part of an overall set of conditions that need to be met. The next section will study these factors and also reveal barriers that hinder the adoption or proper use of drip irrigation despite the numerous advantages it provides.

5.2 ENABLING FACTORS AND BARRIERS INFLUENCING THE USE OF MICRO-IRRIGATION SYSTEMS

In the two years iDEal Tecnologías has been active in Nicaragua it has brought low-cost drip irrigation systems to hundreds of agricultural producers, the majority of which are smallholder farmers. While many have embraced this new technology and literally reaped the fruits of their labor, others have shown little interest and either never installed the system in the first place or discontinued its use. For both iDEal Tecnologías as a social enterprise as well as their non-profit partners (e.g. NGOs or cooperatives) it is of utmost importance to identify the enabling factors and constraints affecting the successful adoption of drip irrigation systems by Nicaraguan smallholder farmers:

[216] Zbinden & Pong, 2005, p.41
[217] Interview with Justo Pastor Torres (E8)
[218] Zbinden & Pong, 2005, p.37
[219] IDE, 2010

- What factors influence the successful use of micro-irrigation systems among Nicaraguan smallholder farmers and what potential barriers exist?
- What is the interplay between "hard" and "soft" factors in determining success or failure of poor micro-irrigation users in Nicaragua?

Before attempting to find answers to these questions, it is necessary to determine what is meant by success or failure with respect to micro-irrigation users. Usually, this issue is dealt with as part of the institution's monitoring and evaluation system. The guide to iDEal Tecnologías' monitoring system can be consulted in Annex 4, which explains the social enterprise's approach to keeping track of its social performance. While the monitoring system takes several dimensions into account, iDEal's success is intrinsically linked to the improved livelihood of its customers. This is to be achieved through increases in crop production for personal consumption and higher income if the harvest is sold. The overall assumption is that better nutrition and income generation will improve the household's well-being, which should be reflected in a higher PPI score and thus lower probability to fall below the poverty line.

Unfortunately, most customers had only been using the low-cost drip irrigation for a short period of time during the author's presence in Nicaragua, so it was too soon to conduct an impact study.[220] Therefore, for the purpose of this thesis the following rough definitions of success and failure of micro-irrigation users will have to suffice.

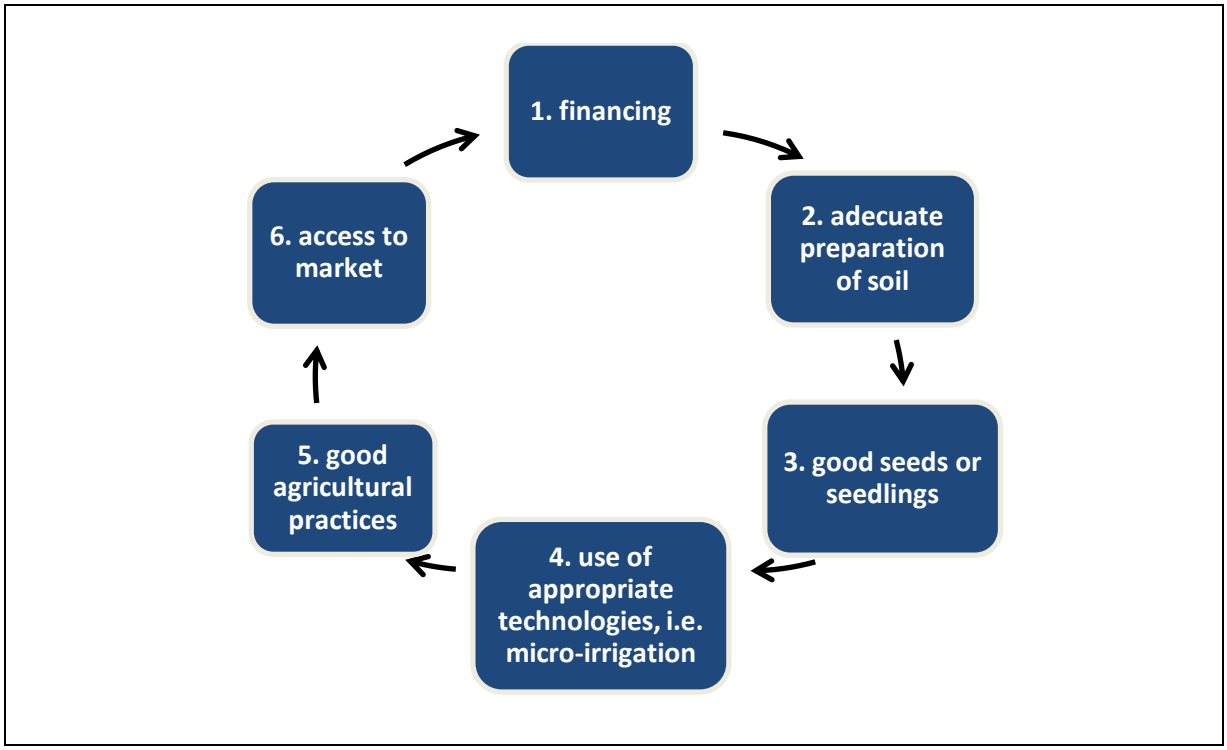
- Success: The drip irrigation system was used continuously and appropriately, which resulted in a satisfactory harvest in the eyes of the smallholder farmer.
- Failure: The smallholder farmer stopped using the irrigation system prematurely or failed to use it appropriately (e.g. by flood irrigating additionally), which resulted in a compromised harvest.

5.2.1 THE CIRCLE OF SUCCESS AND PERSONAL DRIVERS

The agricultural variables analyzed as part of the profil of Nicaraguan smallholder farmers (see subchapter 3.3), which make the commercialization of agricultural products more likely, form a circle of success depicted in figure 13.

[220] During the rainy season, which lasts for about six months from May to November most farmers deinstall the irrigation system because there is no need for it. For an impact study to be able to measure any changes the farmer should at least have used the drip irrigation system for several crop cycles.

Figure 13: Circle of success to increase farming productivity



Source: own figure inspired by Francisco Zamora

Once the necessary financing is available to cover the initial cultivation costs, there are several conditions, which need to be fulfilled in order to have a chance at being a successful agricultural producer.

1. **The beginning stages**
   - Preparation of the soil (leveling, fertilizing etc.)
   - Appropriate seeds (preferably certified) or seedlings of good quality
   - Plague control on the ground
   - Adequate irrigation
2. **Once the crop is planted**
   - Control of plagues, diseases and weeds –> use of pesticides
   - In certain crops (i.e. coffee) control of shadow
   - Fertilization (organic or chemical)
3. **During harvest and post-harvest**
   - Comply with the best standards of the market so as to avoid contaminating or damaging the product
   - Good selection
   - Good handling during transport and storage

4. **Market**
   - Having good access to infrastructure, e.g. roads
   - Establish long term relations
   - If the market demands more variety, consider diversifying production

Figure 13 demonstrates that the micro-irrigation system in itself is not a miracle solution, which allows small-scale farmers to overcome poverty. But if the other conditions of the circle of success are fulfilled and the necessary inner motivation and drive are present, it can be a highly beneficial instrument to provide smallholder farmers with the possibility to produce during the dry season and to diversify their crop.

In fact, personal drivers (e.g. inner motivation, personal effort and willingness) and certain favorable traits of character also play a crucial role. The research revealed the following enabling factors which lead to the successful adoption of micro-irrigation technology and a good harvest.

❖ ***Hard-working individuals***

It will not come as a surprise that all of the successful smallholder farmers had in common that they are hard-working people.

Doña Marina (S1), for instance, is a very active person who uses her time to do several activities. She believes that one should use one's time to do something useful ("Hay que utilizar el tiempo para algo útil"). To her it is incomprehensible that most of her neighbors just sit around all day not doing anything. In her opinion they lead a "rudimentary life", which consists of eating and sleeping ("comen, duermen y se acuestan").

The more successful micro-irrigation users in the dry and remote communities near Somotillo are also known to be hard-working people. Doña Reyna (S5) and her husband both work from 4am to 5pm every day. It is her husband who tends to the field. Don Rider (S6) also dedicates a lot of time to his crops and affirms that "those who say the micro-irrigation system and treadle pump don't function well just don't want to work."

❖ ***Crop cultivation as an aspiration***

Another factor influencing success is the fact that the person views his or her farming activity as the realization of an aspiration and not just something he or she is forced to do out of necessity.

For Doña Marina (S1) and Doña Sofía (S3), for example, tending to their vegetable gardens has become a daily routine, which also has a "therapeutic element". Both stress that their self-esteem has increased because they feel useful, providing for their families through the work with their

own hands. As already mentioned in section 4.2 on aspirations the possibility to cultivate during the dry season has changed Doña Sofía's life. She therefore believes agricultural production is an option to improve her situation and accordingly she is motivated to work hard and dedicate a lot of time to her vegetable garden.

As a commercializing smallholder farmer Doña Marta (S3) makes her living through agriculture. She uses the drip irrigation system to diversify her crop, which allows her to offer a bigger variety of products to her contacts at the local market.

- ***Conviction that the system works and brings advantages***

Those who embraced the micro-irrigation system did so because they were convinced the technology works and that it would be advantageous to them.

In the beginning Doña Marina (S1) tried watering her vegetable garden with a bucket for a while because she thought it would be easier but the plants did not grow in the absence of the steady drip irrigation. She was convinced the irrigation system is effective after having experienced the difference in results herself.

The other successful smallholder farmers visited also experienced the benefits of the micro-irrigation first hand. Many mentioned they produce more than they used to at lower production costs because less is spent on fuel and pesticides. Doña Marta (S3) has even made herself a reputation for producing horticulture of good quality. So from time to time she is approached by the market vendors as opposed to her contacting them.

- ***Being organized***

Being organized may not be a necessary condition for success but it certainly has a positive influence. Doña Marta (S3) and Don Panfilo (S4) were two of the very few smallholder farmers visited who kept a record of their income and expenses. Book-keeping is essential to determine the profit made. Yet, it is very common for Nicaraguan smallholder farmers not to consider the upfront investment when they receive the money for their harvest. In addition, Doña Marta (S3) is currently attending a work shop to learn how to make investment plans.

Another example of how good organization can be beneficial for business is to seal the deal with market vendors beforehand. Doña Marta (S3) for example, keeps in touch with her established contacts at the local market whom she contacts ahead of time to inform them of her current crops and to settle the price before arriving with her harvest.

❖ ***Good and frequent technical assistance***

This is not a personal driver but technical assistance had a positive effect as well. The quality is decisive however. Doña Sofía (S2) for example receives a great amount of attention and support from the NGO, which compensates her lack of experience as a farmer. They provided initial training, give her all the necessary agricultural input and technical advice and check up on her regularly.

Explaining success through autonomous motivation

Although it seems obvious that motivation and personal drive are key determining factors to explain the success of micro-irrigation users, the question remains what makes some people more motivated than others. Explaining attitudes is a very complex undertaking because they vary from person to person and are the result of multiple factors, which need to be studied from interdisciplinary angles. This goes beyond the scope of this thesis but nonetheless, one element of an explanation will be given using self-determination theory, a psychological "macro-theory of human motivation".

According to this theory the type or quality of a person's motivation is more important than the overall amount of motivation. The most beneficial type of motivation is autonomous motivation, which "comprises both intrinsic motivation and the types of extrinsic motivation in which people have identified with an activity's value and ideally have integrated into their sense of self."[221] This confirms the findings that a farmer is more likely to adopt micro-irrigation technology if agricultural production is among his or her aspirations on the one hand, and if he or she is convinced that it works and that using it will provide a benefit on the other hand. With controlled motivation, people "experience pressure to think, feel or behave in particular ways."[222] Even if this type of motivation also directs behavior it is less likely to show lasting results and lead to more effective performance.

5.2.2 BARRIERS TO BEHAVIOR CHANGE

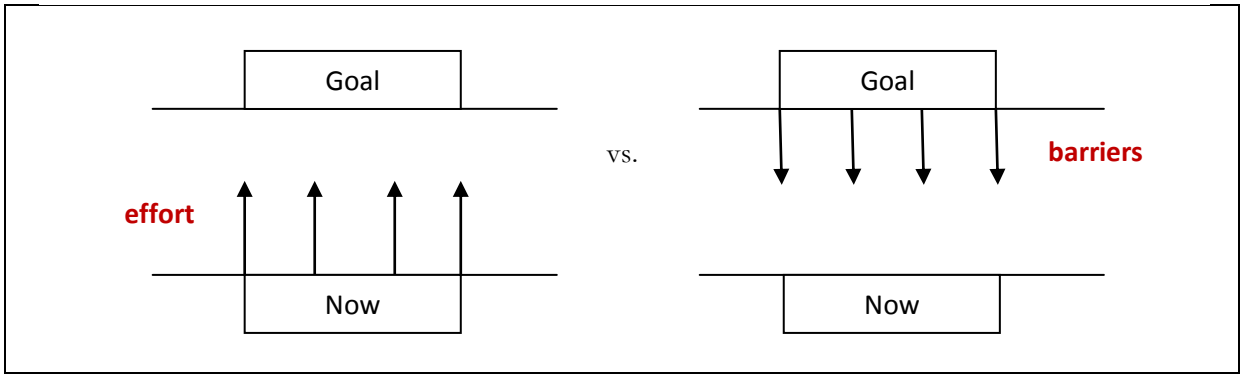
One of the principal challenges to Nicaraguan agriculture is water because no crops can be grown during the dry season, which lasts about six months. And as seen in section 3.1.2 on the different agrarian regions, some regions are even more affected by droughts than others. So smallholder farmers who have the chance to use a drip irrigation system should be thrilled because this enables them to cultivate an additional crop cycle.

[221] Deci & Ryan, 2008, p.182
[222] Deci & Ryan, 2008, p.182

However, the field research showed that a considerable amount of project beneficiaries who had received the equipment did not use it as intended. The psychologist Chakravarti (2006) explains the seemingly illogical behavior of the poor with the different socialization contexts experienced in poverty versus affluence. These differences "may drive systematic contrasts between the two groups' interpretive and sense-making processes, and in their responses to relevant sociocultural stimuli."[223]

In general, there are two approaches to analyze the gap between the present situation and the goal. Either one can start with the premise that the individual has to make a bigger effort in order to reach the goal or one can believe that the person concerned wants to get somewhere but that there are obstacles keeping him or her from achieving the goal.[224]

Figure 14: approaches to analyzing the gap between a goal and the present situation



source: own illustration

Without downplaying the key role of personal effort, there are several potential barriers to behavior change that can negatively influence the adoption of the new technology by poor small-holder farmers. Table 8 shows the Barrier Analysis[225] applied to the adoption and adequate use of drip irrigation systems by agricultural producers.

[223] Chakravarti, 2006, p.367
[224] Interview with Peter Hach (E6)
[225] http://barrieranalysis.fhi.net

Table 9: Barrier Analysis template for drip irrigation use

Type of barrier	Observed/potential barrier
Perceived susceptibility Belief there is little risk in not doing behavior.	It will rain anyway or there will be enough water.
Perceived severity Belief the problem is not serious enough to change.	A minimum of lack of water is not a big deal.
Perceived action efficacy Belief that the action being promoted will fix the problem	Drip irrigation won't provide enough water anyway.
Self Efficacy Belief that I can perform the behavior.	I can't or don't know how to use drip irrigation. I will mess it up.
Perceived social norms Perception of how others will see the behavior.	No other farmers use drip irrigation. They use motors, big pipes etc.
Perceived divine will Belief that it is God/nature's will for him or her to have the problem.	The dry season is the dry season period, even with irrigation.
Perceived negative consequences Belief the behavior will result in some negative consequence.	Drip irrigation will cause me to spend more money; it will take up my time; land can't lay fallow.
Cues for action Inability for a person to remember to perform the behavior.	Individual forgets to water regularly or forgets to install it.

Source: own application of Barrier Analysis

The in-depth interviews revealed the following obstacles to explain why certain smallholder farmers did not use the micro-irrigation system properly or abandoned its use entirely.

- ***Perceived severity (e.g. other priorities or lack of interest and motivation):***

One of the main reasons why some of the smallholder farmers interviewed discontinued the use of the drip irrigation system was that they had other priorities. In the case of Doña Violeta (F2) and her husband, for example, financing the college education of their children is more important than buying a water tank, which would make using the drip irrigation system during the dry season possible. In the area of La Concepción in Masaya ground water is very deep so it is difficult to pump it to the surface. A tank would allow the storage of enough water for irrigation but at this point in time, the family does not see this as a pressing issue.

Another reason for having different priorities is that the farmer's aspiration is actually not to be an agricultural producer. Don Felix (F4) is a prime example of somebody who looks for different business opportunities away from his farm. Instead of producing himself, he prefers buying vegetables from other producers and then selling them in different communities for a small

profit. By spending most of his time commercializing he neglected his own plantain crop.

In other cases the reason for not installing the drip irrigation system in the first place or to dissemble it before the rainy season set in was a sense of laziness and/or lack of interest. Despite several follow-up visits by a technician, Doña Juana (F1) and several other women in a pilot project could just not be bothered to prepare the soil for the installation of the system. Having settled with the production of basic grains for personal consumption, she and her husband do not see the need to put in the extra effort of cultivating vegetables.

This couple furthermore expressed their need to be motivated from the outside. They feel that someone from the NGO should check on them more regularly so that they have an incentive to do something. Instead of showing any intentions to make an effort themselves to try to improve their very humble living conditions they are waiting for help from the outside. Their attitude might be related to the next barrier.

- ***Perceived divine will:***

This barrier refers to the belief that God or nature intended the person not to cultivate during the dry season and so there is nothing he or she can do about it. This leads to a sense of fatalism among many poor smallholder farmers who believe their situation will change and improve if it is God's will ("si Dios quiere") and that there is "no scope for individual effort, nor any guilt, remorse of personal responsibility for their condition." [226]

Related to this sense of fatalism is a certain culture of subsistence among many Nicaraguan smallholder farmers. According to Eduardo Baumeister, a specialist in rural sociology, the problem lies in the widespread perception that everything has to come from the State. The "self" disappears, which explains why so many do not take the initiative to improve their lives or at least try to do so. Instead most smallholder farmers contend themselves with the fact of getting by somehow, thus falling far short of their potential.[227]

- ***Perceived negative consequences:***

Although micro-irrigation can reduce the amount of time and labor necessary on the field, e.g. because the incidence of weeds and plagues is lower, some farmers had the contrary impression. In Don Felix' (F4) experience for example drip irrigation took up more time than conventional flood irrigation because he had to irrigate more often. Indeed, in the case of plantain it is necessary to irrigate three times a week with a micro-irrigation system, while once a week is suffi-

[226] Hundeide, 1999
[227] Interview with Eduardo Baumeister (E5)

cient through the flooding method. Furthermore, the farmer does not have to be present on the field while the motor used to flood irrigate is running, whereas low-pressure drip irrigation needs to be done in blocks. So for someone who would rather not tend his field these steps might seem too much of a burden regardless of what the overall advantages of micro-irrigation might be.

- ***Perceived action efficiency:***

Another type of barrier impeding the proper use of micro-irrigation are doubts about the system's effectiveness. Indeed, in the eyes of a farmer used to irrigate through flooding it might appear unconvincing that a small spurt of water can provide enough water for the plants. Don Mauricio (F3), for instance, wanted to see the soil soaking wet and decided to flood irrigate in addition to using the micro-irrigation system. Needless to say this defeats the purpose of drip irrigation.

- ***Self efficacy:***

The self efficacy barrier consists of the fact that the smallholder farmer is unsure about his ability to use the drip irrigation system. Several participants mentioned that they did not get enough technical assistance and so they did not know how to use the equipment, when and how often to irrigate and how to cope with plagues. Lack of knowledge is indeed one of the major issues among Nicaraguan smallholder farmers in general and regarding drip irrigation and the cultivation of horticulture in particular.

Others faced different obstacles such as the fact that the water source was far away from the field or that they had no water due to rationing during the dry season. Lack of financial means to buy tomato seeds was also mentioned as a reason although this seemed to be an excuse. In either case the smallholder farmer felt he could not find a solution to overcome these obstacles on his or her own.

- ***Perceived social norms***

This barrier to behavior change is based on the person's "perception that most people who are important to him think he should or should not perform the behavior in question."[228] Applied to micro-irrigation this can mean that some smallholder farmers will be reluctant to adopt low-pressure drip irrigation system because the conventional equipment seems manlier. Compared to the others in the community who use motors and big pipes, he might feel ridiculous irrigating

[228] http://barrieranalysis.fhi.net/what_is/behavior_change_theory.htm (accessed 04/05/12)

through small pipes and micro-tubes. In "machista"[229] societies this point is not to be underestimated.

In general, psychological research has shown that "membership groups influence individual behavior through peer group effects that reinforce self-defeating behaviors in social settings via negative role model effects, through social learning from the negative experiences from others, and from gaps in social complements that reduce productivity for lack of support behaviors common in the social structures of the affluent."[230]

Lack of motivation and passive attitude due to international cooperation?

As already mentioned in the section 5.2.1, one of the main findings of this thesis is that motivation and personal drive are key determining factors for the success of a micro-irrigation user. And thus the lack of these traits often leads to unsatisfactory results because the individual is not willing to dedicate the necessary time and effort into the cultivation of his or her crop. Again, it is out of the scope of this thesis to provide a framework to explain this lack of motivation and passive, which is why only one possible explanatory element will be discussed.

Indeed, on several occasions the experts interviewed expressed their impression that the passive attitude of many rural poor, including smallholder farmers, was the result of decades of development programs having created distortions by giving perverse incentives. Both Freddy Ruíz and Francisco Zamora who worked in development for many years are convinced that international development aid and government programs have made the poor used to receiving products and services for free. In consequence, they no longer strive to improve their lives through their own effort but instead expect one project or the other to bring them "soluciones hechas" (ready-made solutions).[231] During the field visits there were indeed cases in which smallholder farmers almost made a list of things they would like an NGO or government program to cover without showing any intention to try to find a solution themselves.

Contrary to these views, Peter Hach from the US Peace Corps, who lived in a rural community for over two years himself and continues working with the rural poor, insists that it is not foreign aid that brings about the passive attitude of Nicaraguans. In his experience, when poor Nicaraguans really want something they will do a lot to get it. If they do not see the point however, they will not put in the effort.[232] A classic example for an inefficient project is given if the organizations want the poor to have something more than the poor want it themselves. Hach agrees

[229] male chauvinist
[230] Durlauf (2001) commented on byChakravarti, 2006, p.370
[231] Interviews with Freddy Ruíz (E4) and Francisco Zamora (E7)
[232] Interview with Peter Hach (E6)

however that the fact of receiving something for free almost inevitable leads to a certain drop-out rate. To keep this number as low as possible it is important for the institution, NGO, or social enterprise to get to know the community they want to engage in so that they understand what the people want and need and what potential barriers might exist. However, doing this on a regular basis is expensive, time consuming and the results are not always accurate because many Nicaraguans tend to say what the local technician or development worker wants to hear and/or provide false information.

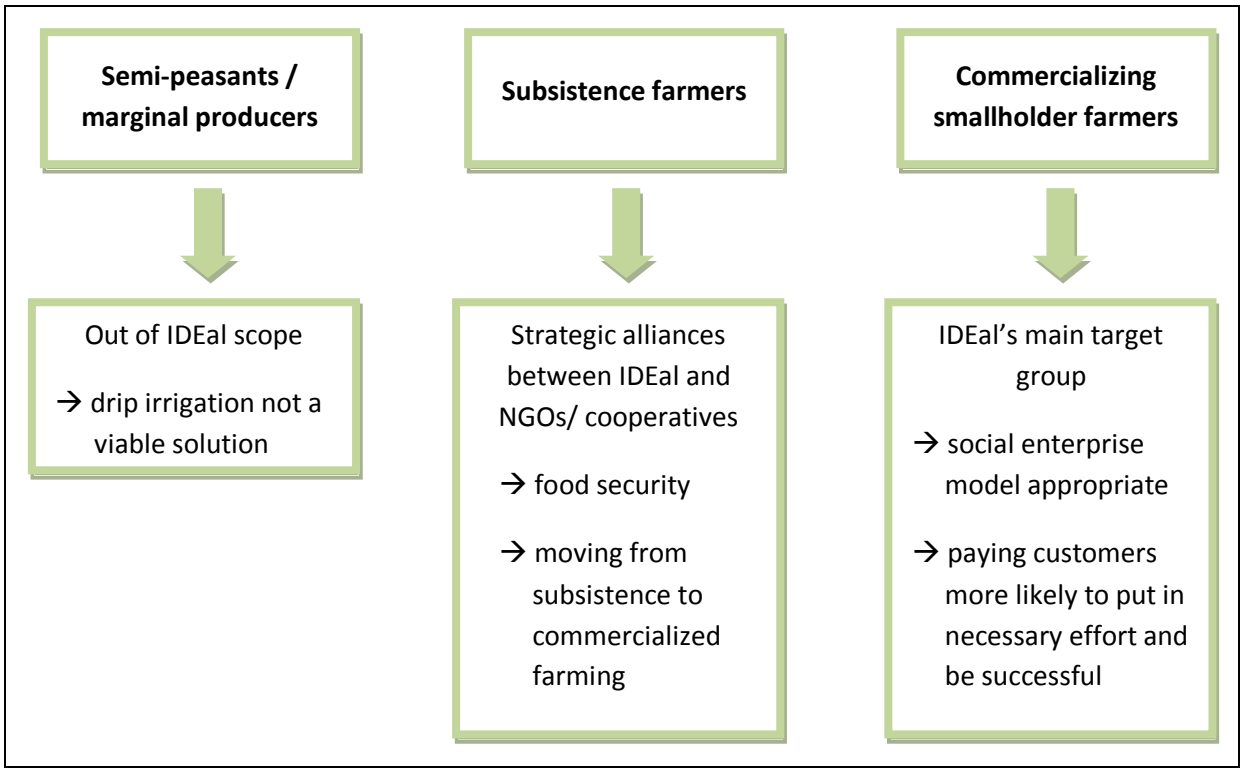
Nonetheless, this is an important exercise because only when the organization is aware of the factors keeping people from reaching their goal or getting to change their behavior is it possible for the NGO to try to remove or overcome the barriers or other resistance factors. In this regard, the following subchapter will gives recommendations for actors wanting to introduce micro-irrigation technology to smallholder farmers.

5.3 RECOMMENDATIONS FOR ACTORS ENGAGING WITH SMALLHOLDER FARMERS

The principle goal of any organization working in rural communities is to induce sustainable improvement through its intervention. In this context sustainability is achieved if the benefits realized are maintained and continue after the end of the project. This refers mostly to the NGO-model but can also be applied to social enterprises such as iDEal Tecnologías that are interested in providing products and services, which leave a lasting impact on the livelihoods of their customers.

In light of this goal, organizations selling or providing micro-irrigation systems are faced with the question of how they can better address the needs and aspirations of small-scale producers in order to increase the success rate of their clients or customers. Their target groups may all be smallholder farmers but the needs and capacities of each of the diverse populations (e.g. marginal producers, subsistence farmers or commercializing farmers) are very different. The challenge is to find the right solution for the right group of farmers and take it to them. So, in both the NGO and social enterprise model, the identification of the main target group(s) is crucial. For the case of micro-irrigation figure 15 gives an overview of the most effective approaches to introduce drip irrigation technology to different types of smallholder farmers.

Figure 15: ways of introducing micro-irrigation to different types of smallholder farmers



Source: own illustration

Micro-irrigation not suitable for semi-peasants

For semi-peasants, for example, micro-irrigation might actually not be a viable solution to improve their livelihood at all because agriculture is not their main occupation. Indeed, if the majority of their time is spent working off the farm, it is unlikely they would dedicate the necessary time and work to the cultivation of high-value crops and the handling of the drip irrigation system. Most smallholder farmers are used to cultivating basic grains with very rudimentary traditional methods, which hardly involves any work. It is not uncommon in Nicaragua that farmers only tend to their crop sporadically, not bothering to remove weeds etc.[233] While this is possible in the case of corn or red bean production, for example, most crops crown under drip irrigation tend to require a lot more care.

The most popular crops planted during the dry season using drip irrigation are horticultures such as tomatoes or peppers. These plants need to be watered daily and checked for plagues regularly because they are more prone to diseases. Consequently, the farmer has to be dedicated to his agricultural production and cannot leave the crops to themselves. Due to the fact that most semi-peasants or marginal producers (who barely produce enough corn and red beans for their

[233] Interview with Justo Pastor Torres (E8)

own consumption) are obliged to work off their farm, they are unable to spend enough time and effort on their own field. As a result they are unsuitable candidates to use micro-irrigation because they have other priorities and are prone to neglect the crop.

Introducing micro-irrigation to subsistence farmers through the NGO-model

Subsistence farmers on the other hand usually spend most of their time on their own farms. So they have the potential to benefit a lot from producing an extra harvest during the dry season. It would improve their food security and could give them the possibility to increase their income if they produce enough to sell the surplus. This could allow them to move from subsistence farming to commercializing.

The reason subsistence farmers do not qualify as a main target group of social enterprises selling drip irrigation systems is that their financial situation hinders them from investing in such technology. Indeed, almost all smallholder farmers spoken to during the field research admitted that they would not have acquired the system if they had had to pay for it themselves. And as seen section 3.3, access to credit is extremely difficult for this group.

Therefore, the most effective way to bring drip irrigation technology to subsistence farmers is for social enterprises to forge strategic alliances with actors already present on the ground and have accumulated a client base and experience in certain rural communities. In the case of iDEal Tecnologías such strategic alliances should include development agencies and NGOs that have the capacity to provide their clients with the whole package of financing modalities, technical assistance, improved seeds and other agricultural input. Without the presence and actions of such organizations it is unlikely that subsistence farmers would have access to these important elements, which improve their potential to be successful producers.

Applying the social enterprise model to commercializing farmers

The social enterprise model is based on the conviction that "poverty alleviation initiatives are more likely to be successful if they treat poor people as customers instead of recipients of charity. This assumes that it is critical for poor people to invest their own time and money to move out of poverty."[234] Therefore, the main target group of social enterprises are the economically active poor who are willing and able to buy the poverty eradication goods and services (e.g. a low-cost drip irrigation system) provided by the private sector. In rural communities the group of economically active poor is mainly represented by commercializing smallholder farmers. They have the most potential to be successful because motivated farmers who are

[234] Paul Polak in foreword of Heierli & Katz, 2007, p.1

willing to invest into an irrigation system are more likely to put in the necessary effort. As Justo Pastos Torres, iDEal Tecnologías' irrigation expert, stresses "the drip irrigation system itself works, it is up to the people to use it adequately."[235]

RECOMMENDATIONS

- Better conceived development projects, which focus on lasting results (medium-and long term) and which systematically address the needs and aspirations of the target groups. The point is to provide goods and/or services that the rural poor in a specific community actually need and want and not to assume the development experts back in the office know what is best for the poor.

- To this end, foster participatory approaches and include the poor into the decision-making process to provide them with an arena to express their needs and practice their capacity to aspire. Collaborative projects would give them the chance to expand their aspiration level beyond tomorrow's meal to the cultivation of skills and the entrance into the larger market.

- Introduce a more effective selection process to include motivated and hard-working individuals into the project. The aim is to increase the project's success rate and sustainability by lowering the probability of participant drop outs. To this end, the NGO or social enterprise should inform itself about the client's or customer's productive system and livelihood strategies to see whether micro-irrigation is appropriate. The screening process should check for the following minimum requirements to qualify for a micro-irrigation project:
    - The beneficiary or customer should be a farmer dedicated to agricultural production who wants to cultivate during the dry season.
    - He/She should have a patch of land at his/her disposal, good soil and have access to a source of water.
    - The person should be motivated (not just because the equipment might be given away for free) and have the desire to work.
    - Experience in agricultural production is desirable but according to the project focus this might not be required (e.g. if the idea is to teach farming to potential producers)

- One possibility is to organize a field day to familiarize those interested with the micro-irrigation technology and provide them with basic training. This way they understand how the system functions and get an idea of the time and work they will need to accord to the

[235] Interview with Justo Pastor Torres (E8)

cultivation of high-value versus basic grain crops. Those who are not really interested and only showed up because of the prospect of receiving something for free are most probably not going to stay until the end of the event. The micro-irrigation system will be given to those who complete the field day and sign a form, thus symbolically committing to the project and assuming responsibility to dedicate the necessary time and effort.

- Just giving the irrigation system away for free without the support from the NGO and the commitment of the project beneficiaries is not a good option because the real value of having the drip irrigation system will not come across and many smallholder farmers will probably not implement the technology adequately.

- High quality technical assistance is vital. Set up a plan for the technicians to visit the farmers to make sure the systems are installed properly and functioning correctly. Regular follow-up visits are important to give advice regarding cultivation and solving possible problems (technical, plagues etc.). The technical assistance provided should take a demand approach, meaning that the issues most important to the farmer are to be addressed even if the latter might be timid to express his real needs in front of a technician at first. If possible the advice of the technicians should furthermore take the limited economic capacity of the producers into consideration.

- To increase the success rate, focus the attention on young agricultural producers who are still susceptible to changes in their habits and ways of cultivating. Farmers who have applied their ancestors' practices for decades are less likely to modify their working patterns and adopt micro-irrigation.

- Convince those who have doubts about the effectiveness of drip irrigation by demonstrating that it works. Simulating a field in a transparent glass container, for example, would allow the skeptic to see for himself that the soil is humid. Having the technicians carry humidity measurement devices on their field visits is another option.

- Create strategic alliances between social enterprises providing the drip irrigation technology and technical know-how and NGOs who are already established in the respective rural communities and have a client base. The NGOs complement the irrigation system by facilitating complete packages including seeds, fertilizer and training.

- Increase the smallholder farmer's knowledge base about basic book-keeping and agricultural marketing, including crop choice and market and value-chain analysis of selected crops in

order to take advantage of marketing windows. At a more advanced level capacity-building in negotiation and contracting would greatly benefit smallholder farmes.

- In areas with stronger institutions, accessible markets and varied income-generating opportunities (e.g. in the region of periurban smallholders), households should be linked to markets and the focus should be put on value chains and the private sector.

6. CONCLUSION AND OUTLOOK

The initial observation upon which this thesis is based is the contradiction that rural poverty levels in Nicaragua remain chronically high although a profound land redistribution process after the Sandinista revolution in 1979 gave many small-scale farmers relatively good access to land smallholders in other parts of the world only dream of. Given that smallholder farmers are the most affected by poverty this thesis investigated their situation regarding hard factors of socio-economic and agricultural nature as well as personal soft factors such as aspirations.

One of the main conclusions is that Nicaraguan small-scale farmers are a heterogeneous group, unlike the impression given by the discourse among development actors in the country. Small-holder farmers are characterized by the fact that their family is the main source of labor, that they are unable to invest into their farm and that they are at the bottom of the value chain. Within this group there are three types of small-scale farmers: 1) semi-peasants who work outside their farm as day laborers, 2) subsistence farmers who produce for personal consumption and 3) commercializing smallholder farmers who are able to produce for personal consumption and the market. However, within these categories, smallholder farmers further distinguish themselves by their regional location, productive system and socio-economic situation and ultimately by their potential to be successful agricultural producers.

In general, smallholders contribute considerably to Nicaragua's agricultural GDP, which is not reflected in their capacity to generate income. To understand why this is the case, this thesis made an assessment of the situation of smallholder farmers regarding several variables to explain why their socio-economic conditions are unsatisfactory, on the one hand, and which obstacles they face to reach higher productivity levels and to commercialize their harvest, on the other hand. Even if smallholder farmers might have sufficient land at their disposal, lack of capital often hinders many of them from cultivating all of it. Those who are able to cultivate, employ very rudimentary traditional techniques and are vulnerable to plagues and climatic conditions. As a result, their productivity is very low and their weak negotiating power impedes them from

receiving a good price for their harvest.

This thesis furthermore identified the most common aspirations of smallholder farmers. In past studies this aspect has often been neglected although aspirations have a big influence on farmers' motivation and actions. The research results confirm Appadurai's (2004) theory that the poor lack the capacity to aspire, implying that they have difficulties identifying their options and the most efficient ways to reach their aspirations. Nonetheless, among the most frequently mentioned aspirations were education, farming and improved living standards.

The insights on the hard and soft factors were applied to a case study on poor micro-irrigation users in order to see how these factors influence their success or failure. Regarding hard factors, micro-irrigation system in itself is just one link in a circle of success to become a commercializing agricultural producer. However, the more important finding is that soft factors such as aspirations and inner motivation are key determining factors. In fact, smallholder farmers who aspire to improve their farming activity, who are hard-working, motivated and convinced about the effectiveness and benefits of micro-irrigation are more likely to use it correctly. Quality technical assistance is another enabling factor. This thesis furthermore identified potential barriers keeping smallholder farmers from embracing drip irrigation technology although it would enable them to cultivate during the dry season. Among them are lack of interest due to other priorities (e.g. if farming is not part of their aspirations), lack of know-how or doubts about the effectiveness of the equipment.

In light of the important role aspirations and motivation play in determining the behavior and attitude of smallholder farmers, development projects could increase their effectiveness by taking a more focused approach and by addressing specific needs and aspirations of the rural poor in determined communities. In order to increase the sustainability of a development project it is important to provide poverty-alleviating products and services that are actually sought after by the poor. Another way to improve the efficiency of social projects is to adopt the appropriate approach for specific target groups.

In the case of low-cost drip irrigation, semi-peasants are out of the scope because they spend most of their time working off-farm. Micro-irrigation systems should be introduced to subsistence farmers via the NGO model (or rather through strategic alliances between the companies providing the technology and know-how and established NGOs with a client base). Commercializing smallholder farmers can be reached through the social enterprise model, according to which they are treated as paying customers.

It is an inevitable reality that there will always be people who lack interest and motivation for

several reasons (e.g. because they do not value the benefit of the product or service or because the activity does not correspond to their aspirations). Therefore, social projects should furthermore implement a better selection process to identify those who are genuinely committed. They should also identify and try to remove potential barriers that might keep smallholder farmers from changing their behavior.

Nonetheless, the question remains of what determines the motivation or passive attitude of smallholder farmers. In the future more research is needed to understand how poverty influences decision-making. It would be helpful to know to what extent their inhibiting socio-economic environment may "block the poor from performing the behaviors needed to access and convert on available and new economic opportunity."[236] Psychological research, for instance, could use self-determination theory as a framework to assess how prolonged deprivation may abridge autonomy, lowering motivation levels, performance efficacy, and experienced well-being.[237] To date this theory has mostly been applied to education, worker motivation and health.

On the whole, to conclude on the situation of smallholder farmers in Nicaragua, as Prabhu Pinglai from the Bill and Melinda Gates Foundation insists "the smallness of the farm is not the problem. The problem is the failure of the state to provide the technology, the infrastructure, the institutional environment, and the incentive systems that allow smallholders to flourish."[238] Indeed, this thesis showed that micro-irrigation in itself is not a miracle solution, which will allow small-scale farmers to overcome poverty. But if the other conditions of the circle of success are fulfilled and the necessary inner motivation and drive are present, it can be a highly beneficial instrument to provide smallholder farmers with the possibility to produce during the dry season and to diversify their crop. After all, even small steps can go a long way in realizing Mohammad Yunus' dream that "maybe one day our great-grandchildren will go to the museum to see what poverty was."[239]

[236] Chakravarti, 2006, p.368
[237] Deci & Ryan, 2008
[238] Pinglai (13/10/2010)
[239] Bornstein, 1996, p.278

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Nicaraguan Census Authority (INIDE): http://www.inide.gob.ni

Ministry of Agriculture (MAGFOR): http://www.magfor.gob.ni

Ministry of Labor (MITRAB): http://mitrab.gob.ni

Rural Poverty Portal (by IFAD): http://www.ruralpovertyportal.org/

ANNEXES

ANNEX 1: LIST OF INTERVIEWEES AND PPI

Table 10: Codes for in-depth individual interviews

Code	Outcome	Name	Region	Gender	Land cultivated (in Mz)	PPI probability to fall below poverty line
S1	Success	Marina Isabel Gonzales Mendoza	Estelí	f	Only 20m² available	58.5%
S2	Success	Sonia María Vanegas Miranda	Madriz	f	0.25 out of 0.5	80.7%
S3	Success	Marta Margarita Sandoval	Managua	f	1 at free disposal	25.5%
S4	Success	Panfilo José Duarte	Boaco	m	0.5 rented	58.5%
S5	Success	Reyna Inocente Carrasco Mejía	Chinandega	f	4 out of 10	80.7%
S6	Success	Rider Manuel Espinoza Espinal	Chinandega	m	10 out of 86	69.3%
F1	Failure	Juana Francisca Vanegas Cardenas	Madriz	f	1.5 of which 1 rented	69.3%
F2	Failure	Violeta Leticia Sandino Aburto	Masaya	f	3.5 out of 6.5	40.6%
F3	Failure	Mauricio Luna Argüello	Boaco	m	1 rented	54.1%
F4	Failure	Felix de Jesús Hernández	Rivas	m	all of 0.75	25.5%

Source: own table

Table 11: Codes for expert interviews

Code	Name	Function	Interview Date
E1	Marlin Sánchez	Regional director of the Nicaraguan microfinance institution FDL	November 18, 2011
E2	María Dolores Monge	Project adviser for rural development projects, Delegation of the European Commission	November 21, 2011
E3	Yuri Marín López	Researcher at Nitlapan	February 12, 2012
E4	Freddy Ruíz Sotelo	Program Officer at the Swiss Agency for Development and Cooperation (SDC)	March 9, 2012
E5	Eduardo Baumeister	Independent researcher specialized in Central American agriculture and rural poverty	March 23, 2012
E6	Peter Hach	US Peace Corps	March 30, 2012
E7	Francisco Zamora	In charge of strategic alliances for iDEal Tecnologías	April 3, 2012
E8	Justo Pastor Torres	Head Technician at iDEal Tecnologías, expert in drip irrigation	April 9, 2012

Source: own table

Table 12: Progress out of Poverty Index (PPI) for Nicaragua

1.	How many household members are there?	CIRCLE	0	A. Eight or more
			10	B. Seven
			12	C. Six
			13	D. Five
			19	E. Four
			26	F. Three
			37	G. One or two
2.	How many household members ages 7 to 12 are enrolled this year in the formal education system?	CIRCLE	0	A. Not all
			1	B. All, and all are in a non-autonomous public school, community school, or other
			3	C. All, and one is in an autonomous or private school
			3	D. No children ages 7 to 12
			13	E. All, and two or more in autonomous or private school
3.	Can the female head/spouse read and write?	CIRCLE	0	A. No
			3	B. Yes
4.	What is the main material of the floor of the residence?	CIRCLE	0	A. Earth, or other
			7	B. Wooden planks, tiles or concrete, mud bricks, or cement bricks or tile (mosaic, ceramic, or glazed)
5.	What type of toilet arrangement does the household have?	CIRCLE	0	A. None
			3	B. Outhouse or latrine (with or without treatment), or flush toilet connected to cesspool, septic tank, river, or stream
			7	C. Flush toilet connected to sewer
6.	What fuel does the household usually use for cooking?	CIRCLE	0	A. Non-purchased firewood
			2	B. purchased firewood
			9	C. Charcoal, butane or propane gas, kerosene, electricity, other, or does not cook
7.	Does the household have a refrigerator?	CIRCLE	0	A. No
			6	B. Yes
8.	Does the household have a blender?	CIRCLE	0	A. No
			4	B. Yes
9.	Does the household have an iron?	CIRCLE	0	A. No
			4	B. Yes
10.	Does the household have a radio, radio/tape player, or stereo system?	CIRCLE	0	A. None
			1	B. Only radio
			5	C. Radio/ tape player (regardless of radio), and no stereo
			10	D. Stereo (regardless of radio and radio/tape player)

TOTAL SCORE: _____

Table 13: Poverty likelihoods according to Nicaragua PPI score

	National Poverty Line	
PPI Score	Total below the national poverty line	Total above the national poverty line
0 – 4	92.0%	8.0%
5 – 9	87.5%	12.5%
10 – 14	96.7%	3.3%
15 – 19	87.3%	12.7%
20 – 24	80.7%	19.3%
25 – 29	69.3%	30.7%
30 – 34	58.5%	41.5%
35 – 39	54.1%	45.9%
40 – 44	40.6%	59.4%
45 – 49	25.5%	74.5%
50 – 54	10.1%	89.9%
55 – 59	10.2%	89.8%
60 – 64	1.2%	98.8%
65 – 69	2.4%	97.6%
70 – 74	3.8%	96.2%
75 – 79	0.0%	100.0%
80 – 84	0.0%	100.0%
85 – 89	0.0%	100.0%
90 – 94	0.0%	100.0%
95 – 100	0.0%	100.0%

Source: Grameen Foundation

ANNEX 2: PROFILING TOOL AND INTERVIEW GUIDE

PROFILING TOOL FOR 50 CUSTOMER VISITS IN NINE DIFFERENT *DEPARTAMENTOS*

1. Name: _____
2. Departamento: _____ Municipality: _____
3. Size of land: _____ 4. Cultivated area: _____
5. Current legal situation of property (own or rented?):
   - ❑ With official legal titel ❑ Rented/ leased
   - ❑ unofficial titel ❑ Indigenous communal land
6. Reason for not cultivating the entire area of land: _____
7. Type of crop: _____
8. How do you finance your agricultural activities?
   - ❑ Own funds ❑ commercial bank ❑ NGO
   - ❑ Microfinance Institution ❑ Co-operative
   - ❑ Money-lender ❑ none

8. On your field, do you apply the following agricultural input?
   - ❑ Fertilizer: Yes / No
   - ❑ Pesticides : chemical / organic / none
   - ❑ Fungicides Yes / No

9. Are the seeds you use for sowing ❑ certified or ❑ from the last harvest?

10. What source of water do you have?
    - ❑ river/ stream ❑ tap water
    - ❑ well ❑ other:

11. From whom do you receive technical assistance?
    - ❑ State institutions
    - ❑ Co-operative or NGO
    - ❑ nobody

12. What kind of farm is it? (to be determined by technician)
    - ❑ Technified farm
    - ❑ Semi-technified farm
    - ❑ Traditional farm

13. What is the destination of the harvest?
    - ❑ Personal consumption ❑ intermediaries ❑ supermarket
    - ❑ Informal sale ❑ market ❑ other: _____

14. What are the main sources of income of your household?
    - ❑ Agricultural production ❑ livestock, processing, arts & crafts
    - ❑ Salaried work ❑ Remittances
    - ❑ Other: _____

15. Where do you go if a family member gets sick? (distance and time necessary)
    - ❑ Health center or public hospital _____
    - ❑ Employee insurance (INSS) _____
    - ❑ Private clinic _____

    Do you have a first aid kit in your house?: Yes / No

16. Which level of education have you reached (completed grade)?
    - ❑ none ❑ secondary school (grades 6-11)
    - ❑ primary school (grades 1-6) ❑ university

DISCUSSION GUIDE FOR SEMI-STRUCTURED IN-DEPTH INTERVIEWS

>> open specific

1. Farm demographics
   How many people live on your farm/house?
   Can you give me a tour of your farm?

2. Stories of recent past
   How did this year's harvest compare to last year's?
   Do you expect next year to be better or worse?

3. What do different members of the household do?
   Could you describe a typical day?
   What activities do women and men do differently?

>> go broad

4. **Aspirations for the future** – use Aspiration Cards
   Choose 3 cards that represent what you hope for the future.
   What did you choose? Describe the images. Why did you choose these cards?

5. System-based questions – use Factors & Forces worksheet
   The innermost circle represents your household.
   The middle circle your household.
   The outermost circle the nation and the world.
   What factors in each of these circles **affect your prosperity**?

6. **Household Resource Flow** – use the worksheet to illustrate or write household revenues and expenditures.

7. Who do you turn to for **information on farming and marketing** your products? In your community? Outside the community? Who do you trust most? Who gives you the best information?

>> probe deep

8. Questions specific to innovation challenge:
   Why were some micro-irrigation users successful and why did others not use the drip-irrigation system properly or stopped using it? What were the **drivers and barriers** influencing the proper adoption of the technology?

Perception of the importance to irrigate:

- How important is irrigation to you? How do you irrigate? Do you use the drip irrigation system?
- What characteristics should an irrigation system have and what services should be provided?

Farmer perception on diversification and high value crops:

- What type of crop do you produce?
- Why do you (not) produce horticulture? What advantages or disadvantage exist?

Experience with drip irrigation and commercializing the harvest:

- What has been your experience with IDEal's drip irrigation system (and treadle pump)?
- How did it improve your daily life? Saving water, gas, time, better harvest? Better diet for family?
- How did producing an additional harvest affect your situation? What did you do with the extra harvest (personal consumption of sold)? If you sold the surplus of the harvest, what did/would you do with the extra income?
- To whom did you sell your harvest? What problems or challenges do you face to sell to a market?
- What problems occurred while using the drip irrigation system? How did you solve them?
- Why did you stop using the micro-irrigation system?

ANNEX 3: COMPARATIVE REPORT TO SELECT AN APPROPRIATE POVERTY INDEX

IDENTIFICATION OF AN APPROPRIATE POVERTY INDEX FOR IDE USE

Natalie Hallensleben

July 2011

For years poverty researchers have emphasized that measuring poverty in monetary terms only is not enough and that a broader approach should be taken in order to determine whether or not a person is considered poor. The aim is to obtain a more comprehensive and more accurate picture of poverty. There are indeed more dimensions that are relevant to a person's well-being. Furthermore this multidimensional perspective is useful to "identify the poorest of the poor or the abject poor segment of the population."[240]

In the context of iDE's Monitoring & Evaluation (M&E) efforts this report explores two international poverty measurement indexes - the Multidimensional Poverty Index and the Progress out of Poverty Index. By comparing both tools on the basis of four criteria, it will be determined which one would be more appropriate to integrate into iDE's M&E matrix. The parameters for selection are the following:

- Applicability at household level (not community or regional level)
- Validity: good, sensitive indicators → does the index change over a short or long period of time when situation changes?
- Simplicity, ease of use
- Current popularity: commonly used and understood → who is using the index already?

Progress out of Poverty Index (PPI)

The Progress out of Poverty Index (PPI) is created by Mark Schreiner for the Grameen Foundation, CGAP and the Ford Foundation. It is an easy-to-use, objective **client poverty assessment tool**, based upon 10 simple indicators that field workers can quickly collect and verify. The PPI **estimates** the likelihood that an individual falls below the national poverty line, the $1/Day/PPP and $2/Day/PPP international benchmarks. For a group, the overall

[240] Wagle (2009), p.175

poverty rate is the average **poverty likelihood** of the individuals in the group. For a group over time, progress (or regress) is the change in its average poverty likelihood.[241]

The way in which the PPT works is as follows: **The index consists of 10 indicators** with an individual response for each that is assigned a value. The sum of the scores for all indicators is the PPI score for that household. The PPI score is associated with a poverty likelihood that reflects the probability that the household falls into certain poverty bands. So a PPI score is *not* poverty likelihood; it is *associated* with poverty likelihood.[242] Low PPI scores (for instance, 1-10) are associated with high poverty likelihoods while high PPI scores (for instance, 90-100) are associated with low poverty likelihoods.

Through the PPI Scorecard IDE would be able to do the following:

1. Segment poverty status of clients into Very Poor, Poor, and Non Poor and validate if the institution is reaching out to intended clients. [can be done with the MPI as well: segment according to poverty intensity]
2. Assess clients' poverty status in relation to the national poverty line. [MPI identifies whether a household is multidimensionally poor (defining poverty as being deprived in at least 30% of the indicators), whereas the PPI calculates the probability that a person falls below one of several predefined poverty lines]
3. Measure changes in clients' poverty status over time and reflect if the institution is achieving its mission. [MPI serves the same purpose]
4. Track client dropouts per poverty status to better understand and respond to their individual needs by developing appropriate products and services. [could be interesting if IDE were to do price differentiation]
5. Analyze the portfolio quality and each poverty level. [might be more relevant for MFIs]

Applicability:

The PPI is one of the few objective data based tools designed to measure and track the economic poverty levels of **individuals** (and groups of individuals) close to the poverty line.[243] It captures a **snapshot** of poverty levels and can be used to **track changes** in those levels **over time**. This corresponds exactly to what IDE needs from an M&E tool.

[241] General Technical Overview
[242] PPI Pilot Training Guide (2008), p.47
[243] PPI Pilot Training Guide (2008), p.5

The PPI is a unique collection of easy-to-collect, country-specific, nonfinancial indicators such as family size, number of children attending school, housing type, and typical foods the family eats. The PPI owes much of its value to the link between the indicators, their weights and the original national level survey. **If an indicator is changed, that link is broken and the PPI score is no longer associated with a poverty line**.[244] In case additional information is about IDE clients required this data can obviously be collected simultaneously but the answers would not be included in the calculation of the PPI score.

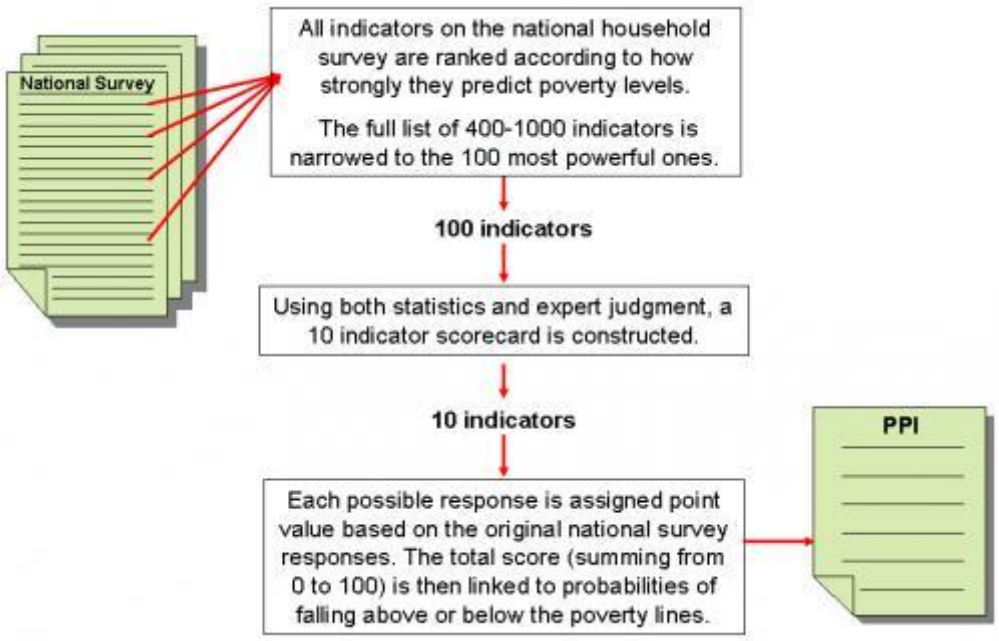
Validity of the indicators and robustness of results:

Regarding the choice of indicators, the **country-specific scorecard is the result of extensive testing**. The indicators in the PPI are derived from the most recent country-specific national level surveys of expenditure or income. These indicators are classified into the following categories:

- Household and housing characteristics (such as cooking fuel and type of floor)
- Individual characteristics (such as age and highest grade completed)
- Household durable goods (such as electric fans and telephones)

Figure 2 shows the construction process of the PPI.

Figure 2: Construction of the PPI



Source: Process out of Poverty Index Overview

[244] PPI Pilot Training Guide (2008), p.16

This final index then serves as a baseline from which client progress is measured for that country.[245]

The choice of indicators is valid in the sense that all indicators have been tested to be strongly correlated with poverty. Furthermore, as the PPI is supposed to be able to **track change of poverty over time**, the selected indicators are liable to change over time as poverty status changes. So the **indicators are sensitive** and allow for a change in the overall PPI score according to whether the participant's situation improved or worsened over time. A one-year interval between interviews should be enough to observe changes in the standard of living of a household, this being the most important dimension of the PPI.

As opposed to the MPI, the PPI limits itself to the dimensions of living standard and education. **Health is not taken into consideration**. In this respect the MPI reflects a more complete and realistic approach to poverty measurement even though there might be some feasibility issues when it comes to obtaining the data on malnutrition and child mortality.

According to Schreiner the main challenge of scorecard design is "not to squeeze out the last drops of accuracy but rather to improve the chances that scoring is actually used."[246] However, even simple scorecards can predict tolerably well, thanks to the empirical phenomenon known as the "flat maximum".[247] Indeed, the **PPI results are highly accurate**: With 90-percent confidence, estimates of **groups' overall poverty rates are accurate to within +/-2 percentage points** and within **+/-12 percentage points for individuals**.[248]

Nonetheless, any measurement system has **some degree of error** built in. The PPI is no exception. What this means is that some people who are actually above the poverty line can end up with a low score. Similarly, some people who are, in fact, very poor can end up with a high score.

The fact that the PPI has undergone accuracy tests and that it derives formulas for standard errors is actually one of the characteristics, which make the technical approach of the PPI innovative (in addition to associating scores with poverty likelihoods). Although the accuracy tests are simple and standard in statistical practice and in the for-profit field of credit-risk scoring, they have rarely been applied to poverty scorecards.

[245] PPI Pilot Training Guide (2008), p.7
[246] Ibid., p. 3
[247] Ibid., p.3
[248] PPI Pilot Training Guide (2008), p.8

Simplicity:

One of the main advantages of the PPI is its simplicity. Although proxy means tests and regressions on the determinants of poverty have been around for several decades, they are rarely used to inform decisions by local pro-poor organizations. Schreiner emphasizes that this is not because these tools do not work, but rather because they are presented in an incomprehensible way to non-specialists. To remedy this problem, the statistical approach of the PPI aims to be **understood by non-specialists**. After all, if managers are to adopt poverty scoring on their own and apply it to inform their decisions, they must first trust that it works. Schreiner stresses that "transparency and simplicity build trust."[249] To this end, the construction process, indicators, and points are **simple and transparent**. Extra work is minimized because the PPI scorecard fits on a single page and it takes **only five minutes** to do the interview and determine the PPI person's score. In addition, non-specialists can compute scores by hand in the field because the scorecard has:

- Only 10 indicators
- Only categorical indicators
- Simple weights (non-negative integers, and no arithmetic beyond addition)

Another point worth mentioning with respect to simplicity is the fact that the entire **information necessary** to apply the PPI for IDE's M&E purpose is available on the Progress out of Poverty **website**. The country-specific questionnaires, poverty line tables as well as a guide booklet for field workers are ready to be downloaded. Given that the indicators would not have to be changed or adapted to IDE projects, this would allow an almost **immediate use** of the PPI.

Popularity:

Although the PPI was primarily developed to track the social performance of **Microfinance Institutions** (MFIs), it is valid for every program serving the poor, not just microfinance.[250] Organizations using the PPI are many and include MFIs such as ESAF Microfinance, FINCA Peru, MF Prisma CEVI, or Fonkoza ASHI. However, there are also **social enterprises** like

[249] Schreiner & Woller (2010), p.2
[250] PPI Pilot Training Guide (2008), p.36

PT Rama in Indonesia that have started using the PPI.[251] Furthermore, organizations like oikocredit, for example, promote the use of the PPI in its network of over 500 institutions.[252]

One explanation for the PPI's popularity might be that its poverty scoring can be used for targeting different services to households with different levels of poverty. So an organization can set cut-offs at any threshold (in terms of PPI score) and at more than one level to differentiate between different categories of clients (special targeting).[253]

PROGRESS OUT OF POVERTY INDEX	
advantages	**disadvantages**
• User-friendly • Practical • Cost effective tool • Not very time intensive • Useful information in order to get to know clients better • Complementary to qualitative data • Attention for local context of poverty →country specific scorecards • Potential of the tool to upscale (wide-spread use)	• Limit in poverty measurement: PPI looks at material assets but doesn't measure quality of assets or the perception of poverty • Targeting tool or impact measurement tool? • Quality of data: important to check for completeness of data, trainings in the tool etc. • Data analysis: possible (mis)understandings about conclusions that can be drawn from PPT related to social impact • Certain scale necessary in order to implement tool • In the case of several MFIs better integration with the overall SPM strategy necessary

Source: based on Gravesteijn (2010)

[251] http://www.microfinancefocus.com/grameen-fdn-releases-report-profiling-progress-out-poverty-index-tool
[252] http://www.universitymeetsmicrofinance.eu/site/fileadmin/planetUniversity/PDF_UMM/Oikocredit_Gravesteijn.pdf
[253] PPI Pilot Training Guide (2008), p.49

Multidimensional Poverty Index (MPI)

The Multidimensional Poverty Index (MPI) was developed by the Oxford Poverty and Human Development Initiative (OPHI) and the United Nations Development Programme Human Development (UNDP HDR). It covers 104 developing countries and is intended to complement income poverty measures.

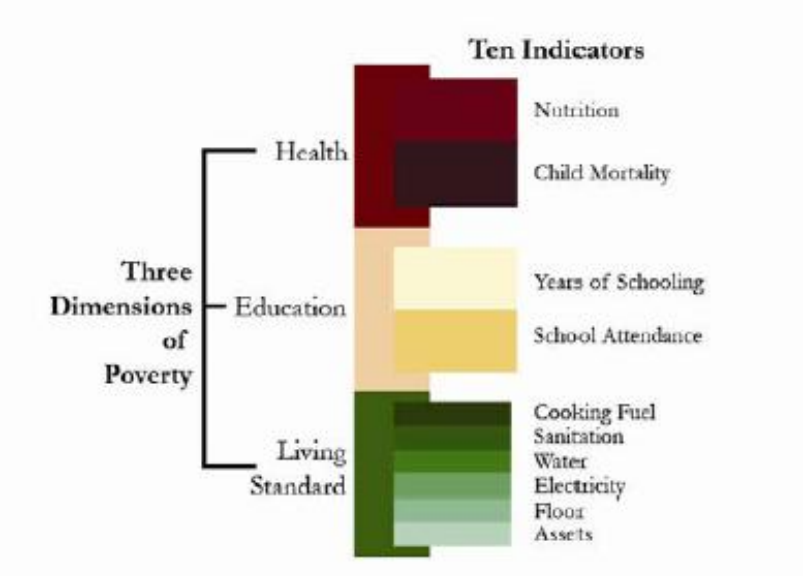
What is distinctive about the MPI is that it reflects the **deprivations that a poor person experiences at the same time**. The MPI identifies overlapping deprivations across three dimensions, namely health, education and living standards, using indicators that are mostly related to the Millennium Development Goals (MDGs). A person is MPI poor if and only if they are deprived in 30% of dimensions.

According to the MPI website, the MPI is "the first international measure of its kind, and offers a valuable complement to income poverty measures because it measures deprivations directly. The MPI can be used as an analytical tool to **identify the most vulnerable people**, show aspects in which they are deprived and help to reveal the **interconnections among deprivations**. This enables **policy makers** to target resources and design policies more effectively. Other dimensions of interest, such as work, safety, and empowerment, could be incorporated into the MPI in the future, as data become available."[254]

The MPI follows a multidimensional approach to poverty, according to which poverty is regarded as **capability deprivation**.[255] In general an individual is considered poor he is below a poverty line. In the multidimensional case, however, two cutoffs must be considered for identification. First, for each dimension, a dimension-specific poverty line identifies the individuals deprived in that particular dimension. The second cutoff determines the number of dimensions, k, in which one must be deprived before they are considered (multidimensionally) poor.[256] Taking exactly this approach, the **Foster-Alkire-Method** was developed in 2008, this being the basis of the MPI. Figure 1 depicts the three dimensions as well as the ten indicators chosen for the MPI.

[254] http://www.ophi.org.uk/policy/multidimensional-poverty-index/
[255] Alkire & Foster (2009), p.4
[256] Bennett & Singh (2010), p.1

Figure 1: Dimensions and Indicators of the MPI



Source: Alkire & Santos (2010), p.13

The website[257] mentions several points thanks to which the MPI goes beyond previous international measures of poverty and allows to:

- Show all the deprivations that impact someone's life at the same time – so it can inform a holistic response. [highly relevant at a macroeconomic decision-making level]
- Identify the poorest people. Such information is vital to target people living in poverty so they benefit from key interventions. [PPI serves the same purpose]
- Show which deprivations are most common in different regions and among different groups, so that resources can be allocated and policies designed to address their particular needs. [more relevant at macro-level; special targeting at micro-level also possible with the PPI]
- Reflect the results of effective policy interventions quickly. Because the MPI measures outcomes directly, it will immediately reflect changes such as school enrolment, whereas it can take time for this to affect income. [very important but the PPI indicators have the same sensibility]
- Integrate many different aspects of poverty related to the MDGs into a single measure, reflecting interconnections among deprivations and helping to identify poverty traps. [MDG tracking is mostly done at the national level]

[257] http://www.ophi.org.uk/policy/multidimensional-poverty-index/

Applicability:

The MPI establishes the 'base' population as the household. So, all household members are considered deprived if at least one person is affected. As opposed to many other poverty measures, its analysis focuses its results on people. By giving equal weight to every human life, "the MPI emphasizes the number of people whose lives are diminished by multiple deprivations- not the number of countries."[258]

The MPI can be used with ordinal data, which arises a lot more frequently in practice when taking a multidimensional approach.

In the MPI, each dimension is equally weighted at one third; each indicator within a dimension is also equally weighted. For example, the nutrition indicator is assigned 1/6 weight and the sanitation indicator receives 1/18 weight.[259] However, the index is currently undergoing a process of potential modification as people (academics, practitioners) give their input and feedback.[260] As a result, there might be changes in the MPI in the future. This could be a reason to wait until a consensus on the different weights has emerged before applying it to IDE's M&E.

Unlike the PPI, the MPI can technically be adjusted to specific needs (the MPI is just one specific example of an index using the Foster-Alkire Method). This means indicators can be changed or added; cut-offs and weights can be redefined although these modifications might be time-consuming.

Validity of the indicators and robustness of results:

As a measure, the MPI has the mathematical structure of one member of a family (Adjusted Headcount Ratio M_0). M_0 measures poverty in d dimensions across a population of n individuals. M_0 summarizes information on the **incidence of poverty and its intensity**. As a consequence of combining the proportion of people that are poor (H) and the average deprivation share of the poor (A), M_0 **satisfies dimensional monotonicity**: if a poor individual becomes deprived in an additional dimension, the M_0 will increase.[261] This is a very important advantage that allows tracking changes in a household's poverty status (e.g. increased or decreased intensity).

[258] Alkire & Santos (2010), p.8
[259] Alkire et ali. (2010).
[260] http://www.ophi.org.uk/policy/multidimensional-poverty-index/mpi-debate/
[261] Alkire & Santos (2010), p.10

Furthermore, "of the 10 indicators, all but one are relatively sensitive to policy change and measure 'flow', which means they will **reflect changes in-country with as little as one year between surveys**. The exception to this is the stock indicator of child mortality."[262] Thus, the criterion of having good sensibility is fulfilled. When the authors refer to "policy change" the question still remains whether this can be seen as an equivalent to measuring IDE's impact on households.

A weakness when it comes to the validity of the MPI is that the "**poverty status of a person is unaffected by certain other changes in achievements**. For example, a poor person can never rise out of poverty by increasing the level of a non-deprived achievement, while a non-poor person will never become poor as a result of decrease in the level of a deprived achievement. This insensitivity is perhaps not unexpected, given the authors' interest in applying the method to ordinal data and in avoiding aggregation before identification."[263]

When it comes to the second cutoff, Alkire and Santos justify their choice of having to be deprived in at least 30% of the indicators. To test the robustness of the decision to use a cutoff of 30%, the percentage of dimensions in which a person must be deprived to be identified as multidimensionally poor was varied from 20% to 40%, instead of using only the value of 30%. When each country's estimate is compared with each other, it is found that in 95.5 % of all possible pairs one country is poorer than the other *regardless* of the poverty cutoff. These results suggest that the 30% poverty cutoff used for the MPI is not a critical choice that dramatically affects results. The **rankings are quite stable and robust for a plausible range of values**.[264] It should be noted however, that IDE's priority is not to establish a ranking of the countries it operates in but wants to measure changes in the poverty status of their clients.

Another big drawback can be identified in the choice of indicators. Although health is a very important component of well-being, which the MPI takes into account (as opposed to the PPI) the **practicality and/or feasibility of obtaining the relevant data in some instances might be low**. It might indeed seem inappropriate in some cultural settings to ask about the death of a child. It might also be a challenge to find out a person's Body Mass Index (BMI). First of all, most clients will probably not know what it is and secondly, it would be time-consuming and maybe awkward if field workers were supposed to weigh clients and measure their height in order to calculate their BMI. Regardless of this, the BMI does not necessarily

[262] Alkire & Santos (2010), p.16
[263] Alkire & Foster (2009), p.37
[264] http://www.ophi.org.uk/wp-content/uploads/OPHI-RP-22a.pdf?cda6c1

reflect micronutrient deficiencies nor is obesity due to unhealthy nutrition considered by the MPI.[265]

Simplicity:

The MPI is supposed to be easily understood and thus to reach a wider public. It is composed of three dimensions (others were not included due to lack of data and consensus about their necessity) and ten indicators, which are equivalent to ten questions. By having few dimensions comparison with income poverty measures is facilitated.[266]

However, the MPI by far puts less emphasis on wanting to be a simple and practical tool. Given that most implementations of the MPI have been at the national and international level, it would be necessary to adapt it to the NGO level and to the local context.

Popularity:

The MPI was developed for UNDP's 2010 Human Development Report and has since caught the attention of many developing countries. Columbia is one of the countries that are currently developing national poverty measurement indexes based on the MPI. Other governments such as those of Mexico, Chile and Bhutan have already development a national poverty measurement system based on the Foster-Alkire-Method in the past years.

[265] Alkire & Santos (2010), p.14
[266] Alkire & Santos (2010), p.12

MULTIDIMENSIONAL POVERTY INDEX	
advantages	**disadvantages**
• Practical, user-friendly • Internationally comparable and robust • Measures incidence and intensity of poverty • Measures overlapping deprivations • MPI can be broken down to see directly how much each indicator contributes to multidimensional poverty • MPI can be decomposed by different population subgroups • Complements monetary measures of poverty • Transparent indicators and weights • Can be used with ordinal data	• Constrained by data limitations • Still in the process of being discussed, extended and improved • Data collection for certain indicators (BMI, child mortality) difficult/ intrusive • Mostly used for comparison and decision-making at country level (though it could be used by NGOs) • Not country-specific → needs to be adapted to local context • Health data relatively weak and questions might be invasive

Comparative summary:

	MPI	**PPI**
applicability	Household level, useful to compare countries or regions	Groups and individuals (≈ household)
validity/ sensitivity of indicators	- indicators largely reflect MDGs - indicators and weights are being discussed → potential changes possible - indicators are sensitive to changes - robust weights and results	- PPI also aims to measure *change* of poverty over time →selected indicators are liable to change over time as poverty status changes - indicators strongly correlated with poverty - PPI results highly accurate
Simplicity	- Easy to understand - Data collection for certain indicators might be intrusive - Need to adapt before implementing	- simple, accurate and practical tool - indicator data is inexpensive to collect, easy to answer quickly, and simple to verify - user friendly weights - PPI can be copied for immediate use
current popularity	- UNDP is using MPI for its annual development report - Many governments interested in applying it on national level	Organizations around the world using PPI (mostly MFIs) → standards of use and certification program exist

Conclusion:

Although both poverty indices are of high quality and improve on past poverty measurement tools, the **PPI fulfills more of the selection criteria for IDE's M&E needs**. Its unit of analysis is the household, it is very simple and can be implemented immediately, the indicators are sensitive to changes in the poverty status and numerous institutions are already implementing it. The MPI, on the other hand, has so far only been used on a national and international level and would therefore not only need to be adapted to the organization level but also to the local context. Despite the fact that an important dimension, health, is not included in the PPI, the indicators proposed in the MPI require data that might be difficult to obtain in some instances.

The disadvantages of the PPI seem reasonable and mostly relate to the proper implementation of the tool. It is therefore important to gain a good understanding of the tool and to pass on this knowledge to the field workers carrying out the interviews. In addition, the disadvantages mentioned are not unique to the PPI and are likely to be common to other tools, none of which are perfect. Keeping this in mind the **numerous advantages clearly outweigh potential disadvantages**, thus making the PPI an appropriate tool for IDE's monitoring and evaluation purpose.

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ANNEX 4: GUIDE TO IDEAL'S MONITORING AND EVALUATION SYSTEM

SEGUIMIENTO AL CLIENTE Y MONITOREO

Manual de uso para los cuestionarios

Enero 2012

Este manual presenta el proceso de seguimiento al cliente y monitoreo aplicado por iDEal Tecnologías y los diferentes cuestionarios de monitoreo que serán administrados por parte de los técnicos de iDEal Tecnologías y sus socios. Además el Índice de Avance para Salir de la Pobreza (PPI por sus siglas en inglés: Progress out of Poverty Index) será tratado en más detalle. Parte del contenido de este documento está tomado del Manual "Monitoreo, seguimiento y evaluación de proyectos sociales del CICAP y del "guía de capacitación para pilotos" hecho por la Fundación Grameen que desarrolló el PPI.

CONTENIDO

I. Monitoreo, seguimiento e evaluación: ¿Por qué lo hacemos?

El monitoreo y la evaluación son herramientas de gestión que proporcionan valiosa información sobre las actividades y los resultados obtenidos. Esta información sobre la calidad y el impacto son importantes no solo para organizaciones no-gubernamentales (ONGs), sino también para empresas sociales que trabajan en el ámbito del desarrollo y como tales tienen la meta de mejorar la situación socio-económica de sus clientes. De hecho IDEal Tecnologías se ha dado la **doble meta de ser a la vez financieramente sostenible**, es decir independiente de la ONG madre y los donantes, **y de alcanzar a los pobres** gracias al bajo costo de sus sistemas de riego. La idea es que este sistema de micro riego permita al productor producir durante la temporada seca. Eso le da una cosecha suplementaria que dará más ingreso y la seguridad alimentaría de su familia. En esta cadena el proceso de seguimiento y monitoreo tiene como objetivo colectar datos para ver si se están cumpliendo las metas.

A. Importancia de tener un sistema de monitoreo y evaluación

Bajo sistema de monitoreo y evaluación, entendemos el conjunto de procesos y herramientas para **recoger y usar información** sobre el funcionamiento y el resultado de las actividades de una ONG o empresa social.

La evaluación es importante porque a pesar de los miles de millones de dólares que se emplean en ayuda para el desarrollo cada año, aún se conoce muy poco acerca del efecto real de los proyectos en los niveles de pobreza. Hay evidencias generalizadas sobre los beneficios que el crecimiento económico, las inversiones en capital humano y el suministro de redes de seguridad tienen en los pobres. Pero para un programa o proyecto específico en un países determinado, ¿la 'intervención' está produciendo los beneficios previstos y cuál fue el efecto general en la población? ¿Se podría diseñar mejor el programa o proyecto para lograr los **resultados**esperados? ¿Se están empleando los recursos de forma eficiente? ¿Se logró el **efecto** previsto? ¿Y a largo plazo, qué cambio hay? Estos son los tipos de preguntas que sólo se pueden responder mediante una evaluación de **impacto**, un enfoque que mide los productos de la 'intervención' de un programa aislándolo de otros posibles factores.

Para poder hacer una evaluación de impacto, se necesita datos que pueden ser colectados a lo largo de la ejecución de un proyecto o una actividad. Este es el enfoque de IDEal Tecnologías. Durante todo el proceso daremos un seguimiento a nuestros clientes y a la vez obtendremos información sobre la producción y su calidad de vida. Esta información nos permite **conocer mejor la situación inicial de nuestros clientes** y de ver **cómo nuestros sistemas de micro-riego influyen la vida a través del tiempo**. En un futuro estos datos facilitarán estudios de impacto o una evaluación global que revelarán los resultados

obtenidos.

Los resultados interesan a nuestros donantes quienes están financiándonos y quienes tienen que justificar que merece la pena contribuir financieramente a un proyecto de micro-riego. Por tanto, un componente del monitoreo e evaluación de impacto ayuda a seguir la pista de nuestros éxitos y **lograr credibilidad con los donantes**. Pero, obviamente los resultados también son de interés para la empresa que ejecuta el proyecto. Es sumamente importante **conocer nuestras fortalezas pero también las debilidades para seguir mejorando nuestros productos y servicios**. Entonces otro componente, si nos damos cuenta de la necesidad de cambiar algo en nuestra política y manera de hacer las cosas, los responsables desearán demostrar una clara conexión entre los objetivos y actividades de IDEal Tecnologías y el resultado político alcanzado. A fin de cuentas, el monitoreo y la evaluación sirven para el aprendizaje interno y para la comunicación externa.

El monitoreo y la evaluación son importantes para obtener información sobre los resultados de las actividades de nuestra empresa social. Por un lado permite lograr la credibilidad con los donantes (**comunicación externa**) y por otro lado produce valiosa información sobre la pertinencia, eficiencia, coherencia y los impactos (**aprendizaje interno**).

B. Explicación de las palabras claves

MONITOREO

El monitoreo constituye una herramienta práctica para larecolección de datos en diferentes momentos dados del desarrollo de un conjunto de actividades. Su función:**medir el 'estado'** de la iniciativa– en concreto, el progreso y loscambios causados- de cara a los objetivos y losresultados esperados formulados y **en base al sistema de indicadores construido en una etapaprevia**. Es un mecanismo para darseguimiento a las acciones y comprobar en qué medida se cumplen las metas propuestas.

Es un proceso sistemático que se ejecuta con la aplicación de instrumentosespecíficos (cuestionarios) cuyos contenidos corresponden a los indicadores ya mencionados. El monitoreose orienta al **control sobre la ejecución de responsabilidades** asignadas y a la facilitación del 'seguimiento', del acompañamiento en el cumplimiento de responsabilidades compartidas. También revisa y **da señales de advertencia** sobre actividades problemáticas que no funcionan de acuerdo a loplanificado.

En el monitoreo se buscan las razones de las fallas comprobadas, con elobjetivo de encontrar alternativas de solución. También pone énfasis en losaspectos considerados como positivos, **reporta logros** para que las prácticasexitosas puedan ser replicadas y las erróneas revisadas.

El monitoreo nosreporta información sobre el nivel de eficiencia alcanzado por la organización o proyecto.Por ende debe ofrecer los datos necesarios para una evaluación (auto)crítica y participativa.

El monitoreo es el proceso de recoger la información rutinariamente sobre todos los aspectos de un proyecto.Su función es medir el progreso y loscambios causados de cara a los objetivos y los resultados esperados formulados y en base al sistema de indicadores construido en una etapa previa.

SEGUIMIENTO

Se entiende por seguimiento la observación, registro y sistematización de la ejecución delas actividades y tareas de un proyecto social en términos de los recursos utilizados, lasmetas intermedias cumplidas, así como los tiempos y presupuestos previstos, las tácticasy la estrategia.

El seguimientose basa en los datos obtenidos a través delmonitoreo. Mientras que el monitoreo mide 'estados', el seguimiento, que es un proceso consta de sus propias etapas-, permite **identificar tendencias** en base a la reflexiónconjunta (participativa) y comparativa (línea base) de cara a los niveles de cumplimientode objetivos y resultados esperados que se van alcanzando. La identificación de estastendencias con sus consecuencias llevará a continuar el camino iniciado, a remediar, o arectificar totalmente. El enfoque principal del seguimiento es la **eficacia del trabajo** que seestá desarrollando. Igual como en el caso del monitoreo, el seguimiento se orienta alcontrol sobre la ejecución de responsabilidades asignadas ya la facilitación de laevaluación a través de este acompañamiento en el cumplimiento de responsabilidadescompartidas.

El seguimiento no sólo apunta a la evaluación, sino es parte integrante detodo proceso evaluativo con enfoque de calidad. El seguimiento es un proceso continuo, mientras que la evaluación generalmente se hace al finalizar una etapa media o al llegar al final del proyecto. De todas formas, ambos elementos marchan unidos, puesto que el seguimiento es una **forma de ir evaluando día a día el proyecto** y en definitiva nos servirá para llegar al momento de la evaluación con más información, además de **permitir la realización de ajustes periódicos**.La evaluación, por su parte, nos permite realizar una valoraciónmás global antes de pasar a otra etapa superior.

Los propósitos del seguimiento son:

- Fomentar la cultura de la evaluación, la gestión del desempeño y la rendición de cuentasen función de los resultados esperados.
- Alinear la evaluación con el ciclo de los proyectos, como un elemento sustantivo de laplanificación estratégica.

- Alentar el aprendizaje institucional de todos los actores involucrados en el proyecto conbase en las evaluaciones efectivas y de calidad.
- Promover el uso de la evidencia proporcionada por el seguimiento.
- Elegir los resultados pertinentes y demostrar cómo y por qué producen los resultadosprevistos o cómo mejoran lo esperado.

El seguimiento permite conocer la pertinencia de las estrategias implementadas, ejecutar acciones oportunas que permitan anticiparse a los problemas, garantizar la sostenibilidad de los proyectos y retroalimentar los procesos de toma de decisiones en el marco de la planeación a mediano y largo plazo.

EVALUACIÓN

La evaluación es un análisis objetivo y sistemático para **medir impactos**. Evaluar implica la aplicación de aquel modelo ometodología de intervención capaz de producir información válida y confiableque permita el establecimiento de juicios sobre el qué y el cómo de los logros deuna determinada actuación.

La Evaluación es un proceso de análisis crítico de todas las actividades y resultados de unproyecto, con el objeto de determinar la **pertinencia** de los métodos utilizados y lavalidez de los objetivos, la eficiencia en el uso de los recursos y el impactoen losbeneficiarios.

La evaluación utiliza la información obtenida y producida por el Sistema deSeguimiento y Evaluación y al **comparar los resultados con los objetivos**,identifica los aspectos que han dificultado o favorecido el desempeño delproyecto, con el propósito de sacar enseñanzas para un futuro proyecto.

La evaluación es un **proceso general de aprendizaje** cuyos fines son, básicamente (1)mejorar las condiciones presentes del proyecto, (2) sacar a flote las posibles insuficienciaso errores del proyecto para contrarrestarlos y prevenirlos en el futuro, y (3) destacar loútil, eficiente y aceptable para actualizarlo teniendo en cuenta las circunstancias queayudaron a su éxito y las nuevas que se prevean. Así la evaluación permite realizar una **valoración** más global.

La Evaluación es un proceso de análisis crítico de todas las actividades y resultados de un proyecto, con el objeto de determinar la pertinenciade los métodos utilizados y la validez de los objetivos, la eficiencia en el uso de los recursos y el impactoen los beneficiarios. De estamanera una evaluación de calidad apunta al aprendizaje institucional y es una herramienta de gestión. En el caso ideal, los resultados de una evaluación constituyen insumos para la toma de decisiones y adecuar rumbos.

DIFERENCIAS entre monitoreo y evaluación:

Las diferencias entre monitoreo y evaluación se refieren más a los mecanismos utilizados, su periodicidad y el objetivo propuesto en la planificación inicial. En teoría, elseguimiento o monitoreoes una actividad de la administracióninterna del programa oproyecto, mientras que la evaluación en si es una preocupación de la agencia que loimplementa o de organizaciones externas a ésta.El monitoreoconsiste en una serie de pasos para la evaluación, ya que permite elseguimientocotidiano del proceso y genera información que servirá de insumo para lasevaluaciones previstas.
Las diferencias más tradicionales entre los dos conceptos los resume el siguiente cuadro:

Monitoreo	Evaluación
Se realiza con mayor frecuencia, se puede decir que es permanente.	*Se realiza con menor frecuencia en períodos generalmente anuales o al finalizar etapas.*
Afecta las decisiones cotidianas, lo que permite flexibilizar la planificación operativa.	*Afecta las decisiones en plazos mayores, por lo general es insumo para la elaboración de la planificación anual y de futuros proyectos.*
Trata de medir la tendencia que llevan las actividades hacia el logro de las metas y objetivos.	*Mide el grado en que se modifica la situación deseado por el cumplimiento de los objetivos y metas en plazos a períodos establecidos.*
Refleja el proceso de ejecución de las actividades del proyecto.	*Refleja el estado o situación en que se encuentra el proyecto y su impacto.*
La información que proporciona está dirigida para ser utilizada hacia el interior del proyecto.	*La información que brinda contribuye al mismo tiempo en el ámbito interno y externo, principalmente entes financieros externos, donantes, contrapartes y población participante.*
Es una herramienta importante para la ejecución del proyecto.	*Es una función importante para reflexionar sobre la planificación.*
Puede modificar la asignación de rubros o recursos del presupuesto aprobados al indicar el cumplimiento de metas.	*Afecta la planificación futura de recursos, incluso puede determinar el plazo del proyecto, cuando se propone ampliar o cerrar un proyecto.*
Se manifiesta a través de documentos (informes), más frecuentes, menos extensos.	*Se manifiesta en documentos (informes) menos frecuentes, pero más extensos.*
Su nivel de acción es la eficiencia.	*Su nivel de acción es la eficacia y los impactos.*
El objeto del monitoreo son las actividades, productos, medios, recursos y resultados.	*El objeto de la evaluación son los efectos y los impactos.*
Corresponde a programación operativa.	*Corresponde a planificación de largo plazo, planes estratégicos.*
Para medir se basa en indicadores empíricos, unidades de medida de las actividades.	*Se base en indicadores de impacto, efecto, resultados.*
El nivel de análisis del monitoreo es la ejecución y la oferta técnica.	*En la evaluación se analiza la visión, misión, objetivos, estrategias y otros aspectos esenciales.*

(fuente: CICAP, "Monitoreo, seguimiento y evaluación de proyectos sociales", 2007)

II. Proceso de monitoreo en iDEal Tecnologías: ¿Cómo lo hacemos?

Somos una empresa con objetivos financieros y sociales. En la parte social nos interesa conocer a nuestros clientes y saber de su progreso. Además estamos interesados en posicionarnos en el mercado como una empresa de productos y servicios de calidad. Esta información será captada por los diferentes cuestionarios presentados en detalle más adelante.

IDEal Tecnologías nace de un programa de la ONG internacional IDE y por tanto adoptamos el aspecto social de nuestra **ONG madre y sus 30 años de experiencia** en el seguimiento a clientes, el monitoreo y la evaluación. Sin embargo, como IDEal Tecnologías ya no es ONG aplicaremos herramientas diseñadas a las necesidades de la empresa. Este proceso de monitoreo será únicamente realizable con el apoyo de nuestra capacidad técnica porque los datos serán colectados durante las visitas regulares a clientes. Por tanto la calidad de la información obtenida depende mucho del **esfuerzo y la responsabilidad de nuestros técnicos**.

A. Visión conjunta del proceso de monitoreo

El siguiente gráfico muestra el sistema de monitoreo aplicado por iDEal Tecnologías:

DATOS	1ª VISITA		T1	T2	T3	T4
	Cuestionariocortoparatodos	Cuestionario largo– línea de base	Cuestionario largo– seguimiento	Cuestionario largo– seguimiento	Cuestionario largo– seguimiento	Cuestionario largo – anual
Info básicasobreproductor	X	X				
Producción		X	X	X	X	X
Calidad de servicio / satisfacción del cliente		X	X	X	X	X
PPI	X	X				X

Cuestionario corto para todos los clientes nuevos

A la hora de las instalaciones de los equipos de irrigación se hace algunas preguntas **a cada cliente** para obtener informaciones útiles. Estas preguntas se encuentran en el **cuestionario corto**[267]compuesto de algunos datos básicos y un índice de pobreza (PPI). La razón para

[267] Corresponde a los partes 1 y 5 del cuestionario largo en el anexo.

aplicar el PPI a cada cliente y no solo a los pequeños productores es que nos interesa qué porcentaje de nuestros clientes puede ser considerado como pobre. Si, por ejemplo, nos damos cuenta de que la mayoría de nuestros clientes ya vive en condiciones muy buenas, tal vez sería una razón para focalizarse más en los productores más humildes – después de todo alcanzar a los pobres eso es nuestra misión social.

El seguimiento más exhaustivo de una muestra de clientes

Primera visita:

A ciertos clientes que serán **elegidos al azar** por un algoritmo en función de las previsiones de venta - y así marcados en la base de datos - daremos un seguimiento más exhaustivo a lo largo del tiempo. Durante la primera visita de estos clientes se hace una entrevista más detallada, aplicando un **cuestionario largo**. El cuestionario entero incluye cuatro bloques temáticos: (1) información básica sobre el productor, (2) producción, (3) calidad de servicio y satisfacción del cliente, y (4) el índice de pobreza. Gracias a los datos obtenidos de esta entrevista inicial se establece una **línea de base**. Esta línea de base revela las condiciones reales en las que viven nuestros clientes al inicio, es decir documenta cuánto producía el productor y cómo vivía su familia antes de utilizar el sistema de riego. Así la línea de base sirve como referencia para comparaciones posteriores permitiendo un análisis antes-después. Esta visita también es la ocasión para entregar al cliente el **librito**para registrar los datos de producción.

Visitas del primer, segundo y tercer trimestre (T1, T2, T3):

Una vez que el equipo de riego esté instalado y utilizado, los técnicos darán un seguimiento más frecuente a estos clientes en la muestra. **Cada tres meses** (después de 3, 6 y 9 meses) visitarán a los productores para volver a hacer las **preguntas sobre la producción, calidad de servicio y satisfacción del cliente**[268]. En los casos donde no es posible ir a la finca en persona para llenar el cuestionario, el técnico responsable puede hacer las preguntas por teléfono. Lo importante es dar un buen seguimiento y colectar los datos cada trimestre.

Visita anual del cuarto trimestre (T4):

Después del cuarto trimestre, es decir **unaño después de la instalación** del equipo se aplicará otra vez el **cuestionario largo** (menos la parte sobre la información básica) que incluye el índice de pobreza (PPI). Así se podrá **estimar el cambio**en la producción y la calidad de vida de nuestros clientes después de haber utilizado el sistema de micro-riego.

[268] Corresponde a los partes 2,3 y 4 del cuestionario largo en el anexo.

B. Explicación del cuestionario en detalle

La siguiente presentación y algunos consejos de manejo se refieren al cuestionario largo que se aplica a los clientes en la muestra a la hora de la primera visita. Se puede consultar el cuestionario en el anexo. Como muestra la tabla arriba, los cuestionarios para las visitas a finales del primer, segundo y tercer trimestre solo contienen las partes 2, 3 y 4 y el cuestionario anual al final del cuarto trimestre está compuesto de las partes 2-5.

Parte 1: Información sobre el cliente

Con esta parte del cuestionario queremos obtener o corroborar unos **datos básicos** del cliente que serán ingresados en la base de datos. Como es una de las primeras visitas (o la primera visita de la parte de un técnico IDEal) se trata también de **establecer una relación directa** con el cliente. Otro asunto importante es la **geo-referencia** (¡no olvidar el GPS!) para saber dónde están ubicados nuestros clientes y para incluirlos en un mapa. Eso nos permite dar mejores servicios. Entonces es importante llenar las casillas sobre la latitud, longitud y elevación cuidadosamente: se tiene que apuntar las letras y cifras exactamente como aparecen en el GPS.

Ejemplo:

latitud	longitud	Elevación (m)
N 13°31'48.4"	W 086°31'58.2"	668

En las casillas donde se pregunta el área de tierra (1.5), el tamaño del equipo (1.6) o la distancia (1.7.) por ejemplo, es sumamente importante apuntar no solo el número sino también la **unidad de medida**. Sino será imposible tratar y analizar los datos después.

En la sección 1.6 se refiere únicamente a productos de IDEal Tecnologías porque queremos saber cuales de nuestros productos tiene el cliente. Así que solo cuentan aspersores nuestros, por ejemplo. Si son de otra marca no se las incluye.

Parte 2: Producción de cosecha principal

Esta es la parte del cuestionario que exige más tiempo porque pedimos mucha información detallada sobre la producción. El objetivo es **controlar la producción, los insumos y la mano de obra**. Por un lado queremos estimar el ingreso obtenido gracias a la producción agrícola. Y por otro lado queremos medir el cambio en la cantidad, calidad, insumos y venta a lo largo del tiempo. Por eso hacemos las mismas preguntas cada tres meses después de la instalación del equipo de riego.

Queremos colectar estos datos no solo sobre los cultivos bajo nuestro sistema de riego sino **todos los cultivos más rentables** del productor. Por ejemplo, si un cliente produce maíz,

frijoles y varias hortalizas, nos interesan los datos para cada uno de estos cultivos incluso si solo las hortalizas están bajo riego.

A veces los productores no manejan bien los datos, lo que exige de los técnicos paciencia y ayudas para recordarse. La fase de prueba ha mostrado que es más fácil si se hace varias preguntas intermediarias para luego estimar la cantidad o el costo total.

Como necesitamos **datos fiables**, introducimos el librito para animar a los productores a tener registro. Durante las próximas visitas o llamadas solo hará falta copiar los datos del librito en la hoja correspondiente del cuestionario.

Como ya se ha mencionado antes, es sumamente importante siempre apuntar la **unidad de medida**, lo que explica por qué hay una casilla extra. Una lista no exhaustiva de las unidades más comunes, como la que se ve abajo, será establecida para facilitar el ingreso de los datos en el programa (eso no es el trabajo de los técnicos).

CÓDIGO DE UNIDADES

g	kg	lbs	quintal	mazorcas	lata	caja	bolsa de 10 kg	bolsa de 25 kg	bolsa de 50 kg	bolsa de 90 kg
1	2	3	4	5	6	7	8	9	10	11

Parte 3 y 4: Calidad de servicio y satisfacción del cliente

El objetivo de estas dos partes es asegurar la calidad de servicio IDEal por parte de nuestros distribuidores y técnicos. Nos interesa sí nuestros socios están cumpliendo con sus responsabilidades, en concreto vender el equipo al precio adecuado, realizar la capacitación, dar seguimiento y asistir en caso de problemas.

De hecho, es en nuestro interés **identificar debilidades** que podamos mejorar con más entrenamientos IDEal. Igual de importante es verificar la satisfacción del cliente con nuestros productos y servicios. Sólo si sabemos qué tipo de problemas ocurren con nuestro equipo o qué puntos de crítica hay en cuanto al servicio prestado, podemos buscar soluciones y mejorarnos en el futuro. La opinión de nuestros clientes en este respecto nos da valiosa retroalimentación (**feedback)**. Por este motivo la parte 4 deja un espacio abierto para comentarios generales y/o recomendaciones.

La gran mayoría de las preguntas están muy claras. Solo algunas indicaciones para las secciones 3.4. y 3.6: En la sección sobre la **costumbre de riego** (3.4) nos gustaría saber si el cliente está utilizando el sistema adecuadamente. Las personas a juzgar si el productor está aplicando la cantidad de agua adecuada no son los productores sino los técnicos. Según la respuesta del cliente (¿cuántas veces?, ¿cuántos litros por planta?, ¿cuántas bloques?), el técnico marca en la hoja si eso es adecuado o no. En la sección 3.6 no hace falta hacer las preguntas porque se trata de **observaciones del técnico**.

Un último comentario sobre los puntos al margen derecho de la hoja: son códigos para las respuestas que captan el ingreso de los datos en el programa más rápido. El programa calculará las calificaciones para la calidad de servicio.

Parte 5: Índice de Avance para Salir de la Pobreza (PPI)

El PPI es un índice de pobreza que nos sirva para conocer más sobre las condiciones en las que viven nuestros clientes. En función de la calificación que corresponde a una **probabilidad de caer bajo una línea de pobreza**, podemos **segmentar nuestros clientes** en un futuro. Por ejemplo, sería posible tener diferentes paquetes de productos y servicios para clientes con necesidades distintas.

El PPI será explicado en mucho más detalle en el siguiente capítulo. Aquí solo se hace notar algunas cosas en referencia a los **indicadores** del índice. Aunque cada PPI es específico para cada país, las preguntas para los países centroamericanos se parecen mucho. Entonces los siguientes comentarios valen tanto para el presente ejemplo, que es Nicaragua, como para los otros países que tienen indicadores similares.

Es primordial saber que el PPI se refiere siempre al **hogar**. Bajo hogar entendemos todas las personas que viven juntos y comparten sus recursos y alimentos. En ciertos casos puede ser que varios hogares viven en una casa. Las preguntas se dedican a la familia del cliente que forma un hogar. Se tiene que tener eso en mente para las preguntas 5.1 y 5.2

Aquí algunos comentarios o consejos, pregunta por pregunta:

5.1 ¿Cuántas personas de su familia viven en su casa?

- Se quiere saber cuántas personas, que forman parte del mismo hogar, viven bajo el mismo techo.

- Si el cliente vive en la finca y la familia en otro lugar, tomamos en cuenta el lugar donde es hogar está basado, es decir el número de familiares que viven en la casa principal.

5.2 ¿Cuántos familiares entre 7 y 12 años asisten a la escuela este año?

- Las giras al campo para probar el cuestionario han mostrado que muchas veces hay confusión para los clientes: nos interesa si los niños que tienen 7, 8, 9, 10, 11 o 12 años van a la escuela regularmente. Una posibilidad de evitar un malentendido es enumerar las edades relevantes o preguntar la edad de los niños y evaluar si califican para la pregunta o no. Si los niños del cliente son menores a 7 o mayores a 12, se marca la respuesta “no hay niños de edades 7 a 12”.

5.3 ¿La jefa de familia/ esposa sabe leer e escribir?

- Queremos saber si la mujer del hogar sabe leer y escribir. No es un error de tecleo.

- Bajo leer y escribir entendemos, ser capaz de leer cualquier texto y escribir frases sin dificultades.
- Si el técnico prefiere es posible hacer otras preguntas adicionales, más indirectas, por ejemplo preguntar el nivel educativo alcanzado. Sin embargo, se tiene que tener en cuenta de que alguien que ha asistido a la escuela solo unos años hace mucho tiempo tal vez no haya aprendido a leer e escribir correctamente o lo ha olvidado. En este caso se tiene que marcar la respuesta "no".

5.4, 5.5, y 5.7-5.10 preguntas sobre el material del piso, tipo de baño o la existencia de ciertos productos eléctricos

- Varias de estas preguntas se pueden verificar visualmente por el técnico así que no hace falta hacer las preguntas al cliente. No obstante, es importante verificar y no solo suponer.
- La pregunta sobre el tipo de baño es tal vez una de las más incómodas pero es un indicador importante. Una posibilidad sería por ejemplo pedirle al cliente usar el baño para verificar la respuesta.
- En cuanto a la pregunta sobre la radio o el equipo de sonido, no nos importa si el cliente tiene televisor. Si solo tiene televisor pero ni radio, grabadora o equipo de sonido, la respuesta a marcar es "ninguno".

5.6 ¿Qué utiliza en casa normalmente para cocinar?

- Si se utiliza leña y gas, se toma en cuenta el material que se utiliza con más frecuencia.
- Si el cliente insiste que los dos sean utilizados exactamente iguales, se marca la respuesta que da más puntos.

III. Comprendiendo el Índice de Avance para Salir de la Pobreza (PPI)

Como ya hemos visto anteriormente, IDEal Tecnologías quiere lograr un doble resultado final, que incluye la **sostenibilidad financiera** y el **impacto social**. Sin embargo, en muchas empresas sociales un enfoque casi exclusivo sobre el desempeño financiero eclipsa a la igualmente importante misión social de la micro-irrigación. Por eso, para las organizaciones que se proponen "sacar" a las personas ycomunidades de la pobreza, es imperativo monitorear el desempeño social al mismo tiempo que el financiero.

Indicadores de Desempeño Social
+
Indicadores de Desempeño Financiero

= Resultados Totales

El Índice de Avance para Salir de la Pobreza (PPI) fue creado para ayudar a resolver esta ecuación. El PPI es un instrumento para la evaluación de la pobreza de un cliente. Es una pieza importante en el rompecabezas para evaluar el desempeño social. Es uno de los pocos instrumentos basados en datos objetivos, diseñado para medir y rastrear el nivel de pobreza de las personas que se encuentran cercanas a la línea de pobreza. Por lo tanto, el PPI ayuda a una organización a monitorear el estatus de pobreza de sus clientes, lo cuala su vez, ayuda a emparejar productos y servicios con diferentes grupos de clientes.

El PPI estima la probabilidad de que una persona caiga debajo de la línea de pobreza nacional,
El estándar internacional de $1/Día/Paridad del Poder de Adquisición (PPA) y/o $2/Día/PPA.
El PPI usa 10 indicadores simples que el personal de campo puede fácilmente recoger y verificar. La puntuación puede ser computada a mano sobre un papel en tiempo real.

A. Características del PPI

El PPI fue desarrollado para ofrecer a instituciones de micro finanzas (IMFs) y empresas sociales la información necesaria para evaluar cuán bien están cumpliendo sus metas sociales.

- ***El PPI es específico de cada país:***

Cada índice es construido empleando datos de ingreso y gasto obtenidosde encuestas a

hogares representativas a nivel nacional. Este índice luegosirve como una línea de base a partir de la cual se mide el avance delcliente para dicho país; por ejemplo: en el caso de Nicaragua la Encuesta de Medición de Niveles de Vida (EMNV) del 2005.

- ***El PPI es fácil de administrar***

Las pruebas de campo demuestran que por lo general le toma al personal decampo un promedio de **cinco minutos para:**

- Conducir la entrevista
- Concordar las puntuaciones
- Determinar el estatus meta del cliente, establecido por la empresa social

Ello permite la rápida y fácil focalización, en la medida en que la calificación puede ser registrada inmediatamente en el terreno con sólo un lápiz y papel.

- ***El PPI es exacto:***

Basados en datos de encuestas nacionales de pobreza, los análisis estadísticos para comprobar la exactitud de la información del PPI demuestran que, en promedio, en un intervalo de confiabilidad del 90%, el PPI es exacto dentro de un +/- 2% para el portafolio agregado, y +/- 12% para las personas.

- ***El PPI es efectivo en términos de costos:***

El personal de campo puede administrar la encuesta durante sus visitasregulares a fincas de los clientes, y pueden computar con facilidad los calificaciones y probabilidades, en la medida en que las puntuaciones sonexpresadas en números enteros positivos que van de 0 a 100.

- ***El PPI, por sí mismo, no aborda la causalidad***.

El PPI captura una instantánea de la los niveles de pobreza y puede ser empleado para rastrear los cambios en tales niveles a través del tiempo, pero no puede detectar la causalidad. Las instituciones deben decidir individualmente las acciones apropiadas a tomarse sobre la información que el PPI brinda.

Con un grupo de control y un análisis más profundo, el PPI puede resultar unelemento clave para determinar el impacto usando el PPI. Eso es justamente la razón por la cual IDEal Tecnologías vuelve a hacer el cuestionario de monitoreo un año después de la instalación del sistema de riego.

- ***Un instrumento para evaluación de la pobreza y enfoque:***

El PPI es un conjunto único de indicadores fáciles de recoger, específicospara cada país, no financieros tales como tamaño de la familia, número deniños que asisten a la escuela y tipo de vivienda.

El PPI no es meramente un instrumento de evaluación y reporte, es unaherramienta de enfoque precisa que puede ser empleada como uninstrumento eficaz para la toma de decisiones.

Por ejemplo, una empresa social puede establecer una calificación específica de cortebasada en sus objetivos sociales y financieros, para hacer el proceso deenfoque y selección de clientes más **explícito y eficiente**.
Cuando las empresas sociales diseñan, prueban e integran la evaluación del desempeñosocial dentro de sus programas, el PPI puede ayudar a una IMF a hacer losiguiente:

- Evaluar cuán bien la misión se traduce en acción
- Dividir a los clientes en bandas de pobreza diferenciadas
- Proporcionar información oportuna y precisa a inversionistas socialmenteresponsables que desean brindar recursos financieros a sus programas
- Apoyar decisiones de gestión para:
    - Mejorar programas, productos, y prestación de servicios
    - Incrementar la competitividad, rentabilidad y capacidad para retener aClientes

Entonces IDEal Tecnologías puede usar el PPI tanto para su gestión interna como para los reportes externos. Estas características parecen interesantes en la medida en que estamos buscando nuevas formas de medir la pobreza, evaluar nuestra focalización y poder hacer un seguimiento del cambio de los niveles de pobreza de nuestros clientes.Además el PPI permite comparaciones con otras instituciones que han adoptado esta herramienta en la región y el mundo.

El Índice de Avance para Salir de la Pobreza es:

- Un instrumento de gestión y medición
- Fácil de emplear
- Preciso
- Un instrumento que puede ser empleado tanto para el aprendizaje interno como para el reporte externo

B. Construcción del PPI

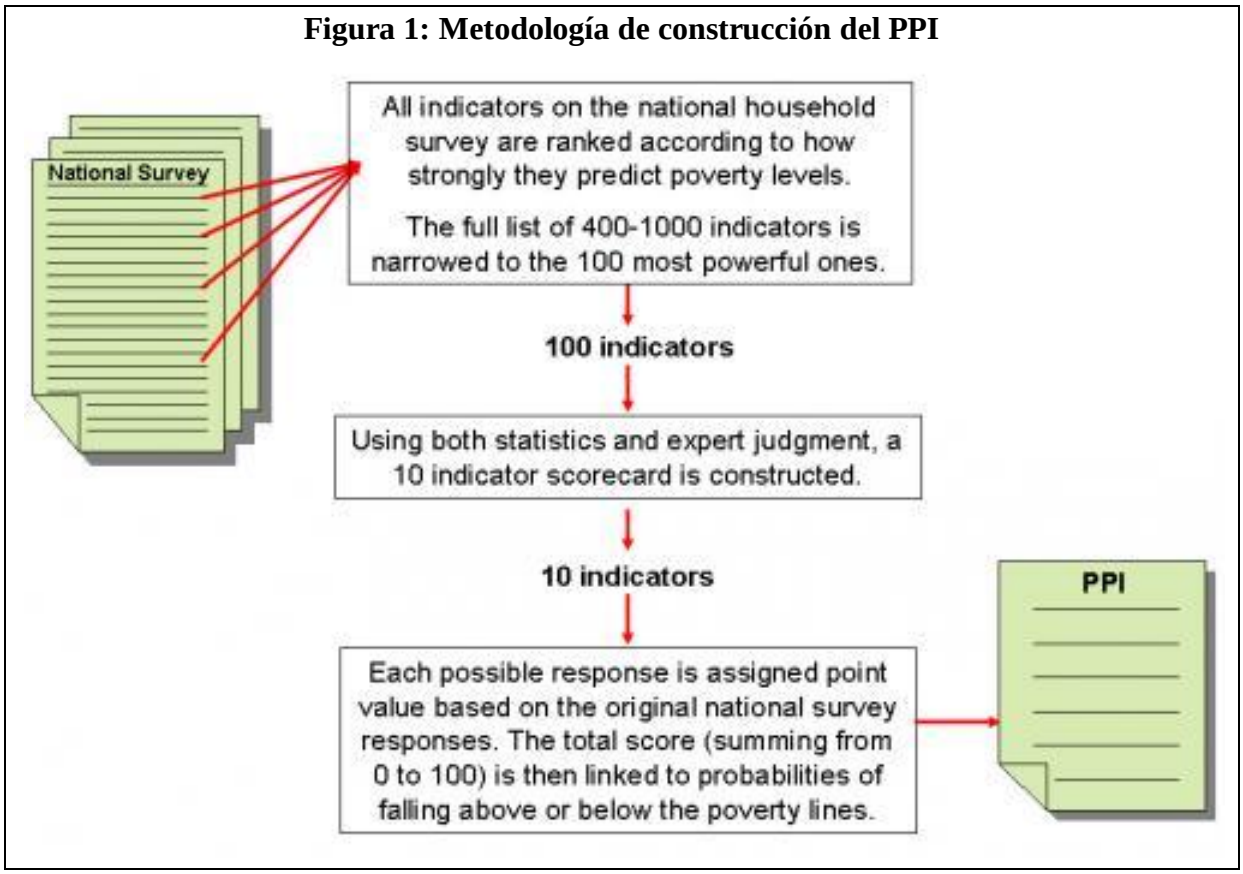
Los indicadores en el PPI se derivan de la encuesta nacional de ingresos o gastos más reciente, o de la Encuesta de Medición del Nivel de Vida del Banco Mundial específica del país.
Cada PPI se desarrolla empleando la misma metodología y análisis de selección (Figura 1):

1. Primero, todos los indicadores de la encuesta nacional están clasificados según el grado con qué predicen el nivel de pobreza. La lista entera de 400-1000 indicadores

está reducida a los 100 más fuertes.

2. Después, estos 100 indicadores están probados por estadística y los juicios de expertos para construir una tarjeta de puntuación (el cuestionario).
3. Por último, se atribuye a cada respuesta posible un valor en forma de puntaje basándose en las respuestas de la encuesta nacional original. Se vincula la calificación total con probabilidades de caer por encima o bajo las líneas de pobreza. La puntuación más baja posible sea 0 (probablemente más pobre) y la puntuación más alta sea 100 (más probablemente por encima de la línea de pobreza).

Figura 1: Metodología de construcción del PPI



La metodología de selección, ilustrada en el Figura 1, se aplica individualmente a cada indicador antes que éste sea seleccionado.

Criterios de selección para los indicadores:

La variación en relación a otros indicadores que ya se encuentran en el PPI es un paso importante dentro de la metodología de selección, porque con frecuencia se encuentra que muchos indicadores son similares en términos de sus vinculaciones con la predicción de la pobreza. Por ejemplo, la mayoría de los hogares que tienen televisión cuentan también con electricidad. Si un PPI ya incluye la opción "tiene televisión", entonces "tiene electricidad" resulta superflua. Por ello, muchos indicadores que se vinculan estrechamente con la pobreza no siempre son seleccionados para colocarse en el PPI porque indicadores similares ya están incluidos. Igualmente, la **capacidad de cambio del indicador en la medida en que cambia**

el estatus de pobreza a través del tiempo es un componente crítico en la selección de indicadores.

El PPI apunta a medir *cambios* en la pobreza a través del tiempo.

C. Uso del PPI

El **principal desafío** del diseño consiste en no maximizar la exactitud sino más bien **maximizar la probabilidad de que las organizaciones usen el PPI adecuadamente**. Cuando falla la puntuación de las proyecciones, usualmente es por inexactitud sino porque los usuarios se niegan a aceptar la puntuación y a emplearla adecuadamente. El desafío no es técnico sino humano yorganizacional; no las estadísticas sino la gestión del cambio.

El PPI fue diseñado para ayudar a los usuarios a entenderlo y confiar en él (y, por ello, a usarlo adecuadamente). Cuando la exactitud es importante, debe ser balanceada con la simplicidad, la facilidad de uso, y la "validez a simple vista". En particular, es más probable que los programas recojan información, computen calificaciones, y presten atención a los resultados si, desde su punto de vista, la puntuación evita crear trabajo "extra", y si todo el proceso en general tiene sentido.

Este enfoque práctico naturalmente lleva a una cartilla de puntuación de unapágina que permite al personal de campo realizar a mano la puntuación de loshogares en tiempo real al presentar las siguientes características:

- Sólo tiene 10 indicadores
- Sólo contiene indicadores observables ("material del piso", no "valor de la vivienda")
- Valores fáciles de usar (números enteros positivos, sin operaciones aritméticas más allá de la simple suma)

La exactitud es importante; la practicidad es más importante.

- **Rastreando los cambios**

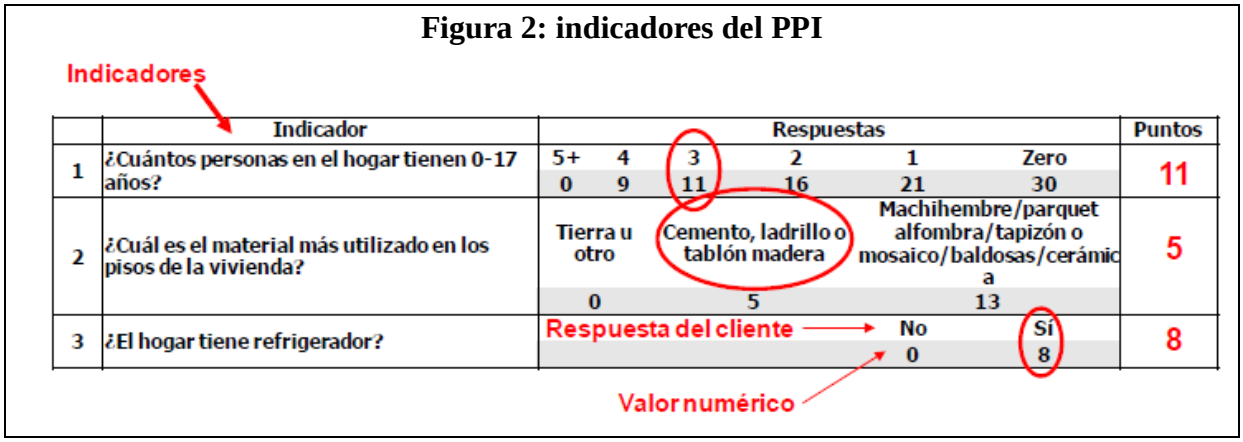
La calificación de un participante corresponde a una "probabilidad de pobreza", es decir, la probabilidad de estar debajo de la línea de pobreza. Para un grupo, la tasa de pobreza en general es la probabilidad de pobreza promedio de las personas en el grupo.

Para un grupo a través del tiempo, el avance (o retroceso) es el cambio en su probabilidad promedio de pobreza.

- **Indicadores**

Cada PPI consiste de 10 indicadores, los cuales están expresados como preguntas con sus correspondientes respuestas predeterminadas (ver abajo). La respuesta de un cliente a cada pregunta debe coincidir con una — y sólo una — de las respuestas. Cada respuesta tiene un puntaje o valor numérico correspondiente.

Figura 2: indicadores del PPI



	Indicador	Respuestas						Puntos
1	¿Cuántos personas en el hogar tienen 0-17 años?	5+	4	3	2	1	Zero	11
		0	9	11	16	21	30	
2	¿Cuál es el material más utilizado en los pisos de la vivienda?	Tierra u otro		Cemento, ladrillo o tablón madera		Machihembre/parquet alfombra/tapizón o mosaico/baldosas/cerámica		5
		0		5		13		
3	¿El hogar tiene refrigerador?					No	Sí	8
						0	8	

En referencia al Figura 2 arriba, si un cliente tiene 3 niños con edades entrelos 0 y 17 años en la casa, el entrevistador marca esa respuesta (tal como sehace arriba) en el indicador #1 y coloca un "11" en la columna de puntaje. El "11" corresponde a esa respuesta, contar con tres personas en el hogar entre las edades de 0 y 17 años de edad, en el PPI.
Cada pregunta debe ser planteada precisamente como se indica. (O en una traducción tan fiel al fraseo original como sea posible).

Gran parte del valor del PPI corresponde a la vinculación entre los indicadores, sus pesos específicos y la encuesta original a nivel nacional. Si se cambiase un indicador, tal cadena se rompería y el puntaje del PPI no estaría ya asociado con la línea de pobreza.

Si un indicador pierde su significado (por ejemplo, debido a la cambiante situación económica), es posible sustituirlo por un nuevo indicador de la encuesta original. En tal caso, todo el peso de las respuestas del indicador tendría que ser recalculado.

Figura 3: preguntas PPI

	Indicador	Respuestas						Puntos
1	¿Cuántos personas en el hogar tienen 0-17 años?	5+	4	3	2	1	Zero	11
		0	9	11	16	21	30	
2	¿Cuál es el material más utilizado en los pisos de la vivienda?	Tierra u otro		Cemento, ladrillo o tablón madera		Machihembre/parquet alfombra/tapizón o mosaico/baldosas/cerámica		5
		0		5		13		
3	¿El hogar tiene refrigerador?					No	Sí	8
						0	8	
4	En el ultimo ano, ¿sembró el hogar algún cultivo agrícola?	No, hogar urbano		Sí		No, hogar rural		9
		0		9		16		
5	¿Tiene el hogar servicio telefónico fijo o celular?					No	Sí	0
						0	10	
6	¿El hogar tiene juego do comedor (mesa y sillas)?					No	Sí	5
						0	5	
7	¿Asisten todos niños de edad 6 – 17 a la escuela?			No	No hay niños de esta edad		Si	0
				0	2		4	
8	¿El hogar tiene baño, inodoro o letrina?					No	Sí	0
						0	7	
9	Principalmente, ¿qué tipo de combustible o energía utiliza para cocinar?				Lena o guano/bosta o taquin		Otros	5
					0		5	
10	¿El hogar tiene un televisor?					No	Si	0
						0	2	
	Basado en la Encuesta de Hogares de 2002						Total	43

Puntuación PPI

- **Puntuación/ calificación PPI**

En referencia al Figura 3 arriba, luego que las 10 preguntas hayan sido respondidas, el entrevistador sumará las respuestas para calcular el puntaje PPI. Todos los puntajes posibles caen entre 0 y 100. El ejemplo muestra a un cliente con un puntaje PPI de 43.

Cada encuesta PPI resulta en un puntaje entre 0 y 100. Ese puntaje del PPI *no* es la probabilidad de pobreza. El puntaje se relaciona a la probabilidad de pobreza basada en la cartilla que aparece abajo.

La puntuación PPI (43 en este ejemplo) es luego asociada con las probabilidades de caer en ciertas clasificaciones de pobreza tal como se muestra en el Figura 4.
El rango de puntaje PPI se coloca en la columna izquierda y el resto de las columnas contienen las probabilidades de pobreza correspondientes.

Figura 4: categorías de probabilidades del PPI

PPI Score	Below the Poverty Line		Total Below National Poverty Line	Total Above National Poverty Line
	Bottom Half Below National Poverty Line	Top Half Below National Poverty Line		
0-4	85.0%	14.3%	99.3%	0.7%
5-9	79.7%	12.8%	92.5%	7.5%
10-14	61.9%	30.0%	91.9%	8.1%
15-19	70.5%	22.9%	93.4%	6.6%
20-24	53.2%	24.4%	77.6%	22.4%
25-29	42.4%	34.4%	76.8%	23.2%
30-34	35.2%	42.6%	77.8%	22.2%
35-39	23.8%	24.8%	48.6%	51.4%
40-44	22.2%	26.1%	48.3%	51.7%
45-49	16.5%	17.1%	33.6%	66.4%
50-54	12.6%	21.8%	34.4%	65.6%
55-59	8.4%	14.2%	22.6%	77.4%
60-64	4.7%	5.4%	10.1%	89.9%
65-69	2.5%	7.6%	10.1%	89.9%
70-74	1.7%	5.2%	6.9%	93.1%
75-79	1.6%	2.2%	3.8%	96.2%
80-84	0.7%	1.4%	2.1%	97.9%
85-89	0.0%	0.0%	0.0%	100.0%
90-94	0.0%	0.0%	0.0%	100.0%
95-100	0.0%	0.0%	0.0%	100.0%

PPI Score of 26

El cliente entrevistado tiene una probabilidad de**76.8%** de caer por debajo de la línea de pobreza y

una probabilidad del **23.2%** de estar por encima de la línea de pobreza.

- **Usando el PPI para estimar tasas de pobreza de grupo**

Un promedio de puntajes de pobreza de todas las personas en un grupoproducirá un puntaje asociado a la tasa de pobreza para el portafolio.

Para determinar la probabilidad de pobreza de la población entera ha deemplearse la tabla para encontrar las probabilidades de pobrezacorrespondientes. Tras identificar tales probabilidades, se toma el promediopara obtener el porcentaje de la población que cae bajo la línea de pobreza.

Figura 5: calificación por grupos

Por ejemplo, una IMF tiene 3,000 clientes

- 800 clientes tienen puntuaciones de 10
- 1,000 clientes tienen puntuaciones de 22
- 1,200 clientes tienen puntuaciones de 33

Puntaje PPI	Debajo la linea nacional de pobreza		Total debajo la linea nacional de pobreza	Total encima de la linea nacional de pobreza
	Mitad inferior debajo linea nacional pobreza	Mitad superior debajo linea nacional pobreza		
0-4	100.0%	0.0%	100.0%	0.0%
5-9	51.6%	48.6%	100.0%	0.0%
10-14	92.0%	8.0%	100.0%	0.0%
15-19	63.7%	35.8%	99.5%	0.5%
20-24	72.6%	24.2%	96.8%	3.3%
25-29	60.1%	35.6%	95.7%	4.3%
30 34	34.4%	51.6%	86.0%	14.0%
35-39	36.7%	44.8%	81.4%	18.6%
40 44	24.3%	43.2%	67.5%	32.5%
45-49	4.4%	55.9%	60.3%	39.7%
50-54	0.1%	33.0%	33.1%	66.9%
55-59	0.2%	45.5%	53.7%	46.3%
60-64	0.2%	11.6%	11.8%	88.2%
65-69	0.0%	18.8%	18.8%	81.2%
70-74	0.0%	3.4%	3.4%	96.6%
75 79	0.2%	7.3%	7.6%	92.5%
80-84	0.0%	0.3%	0.3%	99.7%
85-89	0.0%	0.0%	0.0%	100.0%
90-94	0.0%	0.0%	0.0%	100.0%
95-100	0.0%	0.0%	0.0%	100.0%

$$\frac{[(800*100\%) + (1{,}000*96.8\%) + (1{,}200*86.0\%)]}{3{,}000}$$

= 93.3% de los 3,000 clientes están debajo de la línea de pobreza

- **Usando el PPI para rastrear cambios a través del tiempo**

A través del tiempo, la IMF puede rastrear el avance de un grupo de clientesmonitoreando el cambio en la tasa estimada de pobreza. **Suponga que el mismogrupo** de clientes del ejemplo anterior es evaluado nuevamente un año después yla probabilidad del portafolio está 70% por debajo de la línea de pobreza nacional.

El cambio en la tasa de pobreza es calculado determinando la diferencia (valorabsoluto) entre los años uno y dos.

70.0% - 93.3% = |23.3% |

La tasa de pobreza del grupo ha mejorado en 23.3 puntos porcentuales. Dado queel grupo se compone de 3,000 clientes, este resultado también puede ser expresadocomo que, de 3,000 personas, 699 salieron de la pobreza.El cambio del 23.3 por ciento es la **mejora en la tasa general de pobreza.**

Ello resultado puede examinarse en términos del número de clientes pobres quecruzan la línea de pobreza. Después veríamos el número de clientes que salen de lapobreza dividido por el número de clientes bajo la línea de pobreza en el año uno.

- 2,799 clientes (o el 93.3% del total 3,000) están bajo la línea de pobreza enaño uno
- 2,100 clientes (o 70.0% del total 3,000) are están bajo la línea de pobrezaen año dos.

Así, 699 clientes han cruzado la línea de pobreza del año uno al año dos(dividiendo 699 entre 2,799, arroja 25%).

25% es el porcentaje de pobres quecruzan la línea de pobreza del año uno al año dos.

IV. Entrevistando clientes

Conduciendo las entrevistas

En el caso de IDEal Tecnologías los entrevistadores son técnicos familiarizados con los clientes y que pueden fácilmente conducir laentrevista durante visitas regulares a los clientes.

Es importante que el entrevistador cumpla los siguientes procedimientos deentrevista:

1. Administrar el PPI en la casa de los clientes
2. Sujetarse fielmente a las preguntas y el formato del PPI. No modificar ni variar las preguntas en modo alguno.
3. Asegurarse que cada pregunta sea respondida, ya sea por inspección o respuesta verbal.
4. Dar seguimiento a cualquier cliente pasado por alto, es decir, alguien programado para ser entrevistado pero cuya entrevista no se llevó a cabo por cualquier razón.

- **Observaciones**

Cuando el entrevistador se acerca a la casa del cliente, ya puede empezar aresponder a las preguntas que tienen que ver con los materiales de la vivienda:

- Considera únicamente los materiales
- Empieza a calificar desde que te acercas a la casa
- Si no estás seguro, camina alrededor de la casa para verificar bien
- Verifica nuevamente observando desde adentro

- **Interactuando con el cliente**

Una vez dentro de la casa del cliente, el entrevistador debe presentarse einiciar un diálogo informal para hacer que el cliente se sienta cómodo yganarse su confianza. Algunos ejemplos de preguntas no amenazantesincluyen:

"¿Cómo estás?"-- *"¿Cómo está tu familia?"*-- *"¿Cómo está tu salud?"*

Es importante explicar al cliente el propósito de la entrevista sin darle razonespara que altere sus respuestas. Refiérase a la siguiente muestra deintroducción.

"Buenos días/buenas tardes. Estoy haciendo una pequeña encuesta de la parte de IDEal Tecnologías.El objeto de la encuesta es entender como la gente está usando el sistema de riego por goteo que compró y para saber si hay algún problema con el equipo o el servicio

que ha recibido hasta ahora. Todas las respuestas serán tratadas de manera estrictamente confidencial."

Al llegar a la parte PPI es recomendable explicar otra vez el objetivo de la encuesta, esta vez poniendo el énfasis en los aspectos sociales más que técnicos. Por ejemplo:

"En IDEal Tecnologías siempre deseamos saber si estamos ayudando a nuestros clientes. Por eso nos gustaría conocer mejor la situación de nuestros clientes. Me gustaría hacerle algunas preguntas más sobre su familia y su casa que nos pueden servir para ver cómo nuestros servicios le están ayudando."

Si en cualquier momento de la entrevista el cliente expresa incomodidad, el entrevistador debe volver a un diálogo más informal para hacer que elcliente se sienta cómodo, antes de retomar la entrevista.

- **Completando la encuesta**

Cada pregunta debe ser respondida. Los entrevistadores deben revisar sutrabajo para asegurarse que ninguna de las preguntas ha sido pasada por alto.Para preguntas que puedan ser verificadas por el entrevistador a través de laobservación directa, debe tenerse cuidado de asignar un puntaje y no dejar lasección en blanco.

La calificación PPI total puede luego ser calculado sumando todos los puntosobtenidos por cada pregunta, y buscando y registrando la probabilidad depobreza correspondiente en la cartilla. Ello puede tener lugar en el terreno ouna vez llegado a la oficina.

V. Anexo: cuestionario largo para la línea de base

											D	D		M	M		A	A	A	A
NÚMERO DEL CLIENTE										NOMBRE DEL TÉCNICO	FECHA DE LA ENTREVISTA										

PARTE 1 – INFORMACIÓN SOBRE EL CLIENTE

1.1	INFORMACIÓN SOBRE EL ENCUESTADO			
		M	F	
APELLIDO	NOMBRE	SEXO		NÚMERO DE TELÉFONO

1.2	DIRECCIÓN:			
MUNICIPIO	DEPARTAMENTO	LATITUD	LONGITUD	ELEVACIÓN (m)

1.3	TIPO DE FINCA		
FINCA	PATIO	SITIO DE DEMOSTRACIÓN	ORGANIZACIÓN ASOCIADA/COOPERANTE

1.4	NOMBRE DE LA ORGANIZACIÓN Y CONTACTO

1.5	¿Cuál es el **área total de tierra** utilizado para su producción?		
		ÁREA	UNIDADES

1.6	Productos iDEal	PRODUCTO	TAMAÑO (m2; Mz)	FECHA DE INSTALACIÓN						
		MICRORIEGO								
		PRODUCTO	CANTIDAD	M	M		A	A	A	A
		BOMBA DE PEDAL								
		BOLSA DE ALMACENAMIENTO DE AGUA								
		ASPERSORES								

1.7	¿Cuál es su principal **fuente de agua** para regar? *[MARQUE UNO]*	FUENTE	✓	DISTANCIA DEL CAMPO (m)
		RÍO/CORRIENTE		
		POZO PROFUNDIDAD (m):		
		LLAVE/POTABLE		
		OTRO (ESPECIFIQUE):		

PARTE 2 – PRODUCCIÓN DE COSECHA PRINCIPAL

	TIPO DE CULTIVO (**Favor de incluir los cultivos más rentables que produjo últimamente)**											
	1.		2.		3.		4.		5.		6.	
FECHA de siembra												
ÁREA sembrada												
Unidades de ÁREA (Mz, ha, m2...)												
Se utilizó RIEGO?	Sí	No	Sí	No	Sí	No	Sí	No	Sí	No	Sí	No
Cantidad COSECHADA												
Unidades COSECHADAS (lbs, kg,...)												
Cantidad VENDIDA												
Unidades VENDIDAS (Kg., mazorcas...)												
Precio de VENTA por unidad												
Cantidad de SEMILLAS/PLÁNTULAS												
Unidades de SEMILLAS (kg, caja...)												
Costo de SEMILLAS (unidad)												
Costo PESTICIDAS												
Costo de FERTILIZANTE												
Costo de PREPARACIÓN tierra												
MANO DE OBRA contratada												
TRANSPORTE												
OTROS costos												
DESTINO de la producción cosechada												

PARTE 3 – CALIDAD DE SERVICIO

3.1	**LOS PRIMEROS PASOS**		
¿Cuánto pagó por el sistema de micro-riego?			
¿Le dieron la carta de garantía?	A. Sí B. No	CIRCULE	1 0
¿Le organizaron un evento de capacitación?	A. Sí y asistió B. Sí pero cliente no asistió C. No hubo capacitación	CIRCULE	2 1 0
¿Sabe instalar el sistema por si mismo?	A. Sí pero el distibudor/instalador vino para instalarlo B. Sí instaló el equipo por si mismo C. No sabe instalar por si mismo	CIRCULE	2 1 0
¿Durante el entrenamiento de instalación estuvo disponible alguien de su familia o un vecino/amigo cercano?	A. Sí B. No	CIRCULE	1 0

3.2	**POSIBLES PROBLEMAS CON EL EQUIPO**		
¿Ha tenido algún problema con el sistema?	A. No B. Sí, pero está resuelto C. Sí, y todavía persiste	CIRCULE	2 1 0
Si hubo problema, describe:			
¿Cómo resolvió el problema?			
¿Un técnico del distributor le ayudó a solucionarlo?	A. Sí B. No	CIRCULE	1 0

3.3	**FRECUENCIA DE LAS VISITAS**		
¿Cuántas veces lo han visitado para asegurar el buen funcionamiento del sistema desde que instaló el sistema de riego?	A. Más de 3 veces B. 3 veces C. 1 o 2 veces D. Nunca	CIRCULE	3 2 1 0

3.4	**COSTUMBRE DE RIEGO:** Indique si la costumbre de regar era adecuado para el cultivo sembrado		
¿Cuántas veces riega o regaba a la semana?	A. Frecuencia de riego adecuado B. Muy a menudo C. Muy poco	CIRCULE	2 1 0
¿Cuántos litros por planta?	A. Cantidad adecuado B. Cantidad insuficiente	CIRCULE	2 1

	C. Cantidad muy alta		0
Cuántos bloques de riego hace?	A. Número adecuado B. Número insuficiente C. Número demasiado alto	CIRCULE	2 1 0

3.5	**SATISFACCIÓN DEL CLIENTE**		
¿Cómo califica el servicio del distribuidor/ instalador del sistema de riego?	A. Excelente B. Bueno C. Regular D. Malo	CIRCULE	3 2 1 0
Explicación:			
¿Cómo califica el sistema de riego?	A. Excelente B. Bueno C. Regular D. Malo	CIRCULE	3 2 1 0
Explicación:			

3.6	**OBSERVACIONES DEL TÉCNICO**		
¿Cómo es la composición del sistema?	E. 100% iDEal F. No es 100% iDEal (híbrido)	CIRCULE	1 0
¿El sistema está instalado correctamente?	E. Sí F. No (menciona problema):	CIRCULE	1 0

PARTE 4 – COMENTARIOS GENERALES

4.1	¿Por ultimo, tiene algún comentario o recomendaciones para iDEal Tecnologías?

PARTE 5 – INDÍCE DE AVANCE PARA SALIR DE LA POBREZA (NICARAGUA)

5.1	¿Cuántas personas de su familia viven en su casa?	CIRCULE	0	H. Ocho o más
			10	I. Siete
			12	J. Seis
			13	K. Cinco
			19	L. Cuatro
			26	M. Tres
			37	N. Uno o dos
5.2	¿Cuántos familiares entre 7 y 12 años de edad asisten a la escuela este año?	CIRCULE	0	C. No todos
			1	D. Todos, y todos van a una escuela pública no-autónoma, una escuela comunitaria, u otra
			3	E. Todos, y uno va a una escuela pública o privada
			3	F. No hay niños de edades 7 a 12
			13	G. Todos, y dos o más van a una escuela pública o privada
5.3	¿La jefa de familia/ esposa sabe leer e escribir?	CIRCULE	0	C. No
			3	D. Sí
5.4	¿De qué material es el piso de la casa?	CIRCULE	0	C. Tierra, u otra
			7	D. De madera, embaldosado, ladrillos de barro, ladrillos de cemento o cerámico
5.5	¿Qué tipo de baño tiene en su casa?	CIRCULE	0	D. Ninguno
			3	E. Letrina/ sumidero (con o sin tratamiento), inodoro conectado a pozo, tanque séptico, río o corriente
			7	F. Inodoro conectado a alcantarilla
5.6	¿Qué utiliza en casa normalmente para cocinar?	CIRCULE	0	D. Leña no-comprada
			2	E. Leña comprada
			9	F. Carbón, gas butano propano, kerosene, electricidad, u otro, o no se cocina
5.7	¿En su casa hay refrigerador?	CIRCULE	0	C. No
			6	D. Sí
5.8	¿En su casa tiene licuadora?	CIRCULE	0	C. No
			4	D. Sí
5.9	¿En su casa tiene plancha eléctrica?	CIRCULE	0	E. No
			4	F. Sí
5.10	¿Hay en su casa, radio, grabadora o equipo de sonido?	CIRCULE	0	C. Ninguno
			1	D. Solo radio
			5	G. Radio/grabadora (independientemente de la radio), y sin equipo de sonido
			10	H. Equipo de sonido (independientemente de radio o grabadora)

CALIFICACIÓN FINAL: _____

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."

May 20, 2012, Natalie Hallensleben
