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Identifying the Factors that Influence Small-scale Farmers' Transaction Costs in Relation to Seed Acquisition

An ethnographic case study of maize growing smallholders in the Central Valleys of Oaxaca, Mexico

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Abstract

Using an ethnographic approach, this study explores small-scale farmers' perceived transaction costs in relation to maize seed acquisition in the Central Valleys of Oaxaca. These farmers have different needs and require seed of diverse maize types with multiple traits in particular combinations. Formal seed distribution has yet to develop in this region and farmers depend mostly on informal seed sources. Issues of information about maize seed, seed transaction negotiation and enforcement are examined from a small-scale farmer perspective through the use of qualitative data. Results show that farmers' perceived transaction costs are low to negligible in most cases where seed transactions take place locally, and trust is indicated as a factor which serves to reduce transaction costs to a minimum. Though maybe not a transaction cost in the theoretical sense, the risk of crop failure due to inadequate seed is a main concern for farmers in relation to seed transactions.

Key Words: Small-scale farmers, Transaction costs, Seed acquisitions, Maize (Zea mays L.), Informal seed sector, Oaxaca.

JEL: D23 (Organizational Behavior; Transaction Costs; Property Rights)
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Contents

Introduction

This paper presents the findings of an exploratory study with the purpose of identifying the factors that influence the transaction costs of acquiring seed for maize growing small-scale farmers in the Central Valleys of Oaxaca, Mexico.

A formal seed sector has yet to develop in this region, and most farmers therefore continue to produce their own maize seed year after year. However, maize farmers in the study area occasionally acquire seed from other sources, mostly other farmers, either because of seed loss due to climatic or storage problems, or because they want to try out / work with other kinds of maize. Previous research in the region showed that 89.7% of maize seed lots were saved by farmers from their own previous harvest, and the rest were acquired from other farmers (Smale et al. 1999).

These farmers have different needs and require seed of diverse landraces with multiple traits in particular combinations. Finding seed that meet the individual farmer's particular requirements is not always easy (CIMMYT 2002). First, the farmer has to find out who grows what maize variety and investigate the characteristics and performance of the maize of interest. Then he/she must make sure that the information offered is trustworthy and the seed is reliable. Finally, he/she has to negotiate the conditions of the transaction with the seed provider. Under such conditions it seems reasonable to expect that acquisition of seed of diverse maize varieties entails high transaction costs to individual farmers.

The study was financed by the FAO and undertaken in Mexico by CIMMYT's Economics program in collaboration with the FAO. The research was carried out using qualitative research methods and was supported by a considerable body of information previously collected by CIMMYT in the region. The experience and results of this study will provide the basis for the design and planning of a second phase, which will attempt to quantify the transaction costs experienced by various social actors in relation to seed transactions.

The paper starts out with some general considerations regarding the scope and focus of the study, the methodology used and a brief description of the study area. Subsequently, the presentation of the findings is structured according to the key issues raised in the economic literature on transaction costs. This is followed by a discussion, and finally, a conclusion.

Scope and focus of the study

This research was carried out using an ethnographic approach. Fundamental to the ethnographic research method is trying to understand the issues at hand, e.g. the factors that influence maize growing smallholders in relation to maize seed acquisitions, from the perspective of the people directly involve herein. This requires an open approach and a willingness to step out of one's own personal or professional ways of thinking. Instead the researcher must seek to understand what constitutes the important issues from the informants' point of view, in this case the small-scale maize farmers in the Central Valleys of Oaxaca.

From a different point of view, the small-scale farmers' perspective may not necessarily appear to be rational and coherent, and it may not fit nicely into a preconceived model of how farmers should consider their reality. We should therefore not be surprised that the findings do not coincide fully with the model we took as a point of departure, i.e. the concept of transaction costs as presented in the economic literature.

On the concept of transaction costs:

The objective of this paper is to identify and describe the various factors that influence farmers' transaction costs in relation to seed acquisitions. The term "transaction costs" has been defined as "the costs incurred by participants in an exchange in order to initiate and complete the transactions" (Dudek and Wienar, 1996, in Cacho, Marshall and Milne 2003). Transaction costs are often subdivided into search or information costs (costs of obtaining information about the product and it's price as well as about trading partners), negotiation costs (costs of negotiating and carrying out the transaction), and monitoring or enforcement costs (costs of ensuring terms of transaction) (Hobbs 1997, Gabre-Madhin 2001, Dahlman, 1979, in Cacho, Marshall and Milne 2003).

Transaction costs are specific to each market participant. As pointed out by Sadoulet and De Janvry (in Gabre-Madhin 2001) this means that there is no single effective market price at which exchange take place. Furthermore, as argued by Buckley and Chapman (1997), "transaction cost issues cannot be understood apart from issues of perception", i.e. the perception and definition of reality of social actors. Therefore, transaction costs are difficult to measure in any objective way.

In this paper, transaction costs are understood in a broad sense and may include other costs or "sacrifices" that farmers may have to incur to carry out a seed transaction—even if unsuccessful. These include opportunity costs in terms of time, loss of prestige, risk assumed or other.

The concept of transaction costs is essentially a child of economic theory, although it has also been used by non-economists studying different aspects of economic life, e.g. Plattner 1989, Godoy 1993, Mayer and Glave 1999. However, the concept of transaction costs does not exist as such in the terminology of ordinary Oaxacan small-scale farmers. As stated above, the ethnographical approach is open and does not define the issues before the study is undertaken. Instead, this approach seeks to understand the issue from the informant's perspective. As such, the point of departure for this study was to try to identify the costs, sacrifices or concerns, which farmers experience in relation to seed transactions.

Admittedly, this rather nebulous definition may not be sufficient for the purpose of an analysis based on economic theory, however, in as far as it is our goal to understand what factors farmers consider a sacrifice in relation to seed acquisition; it is necessary to be willing to examine this from a farmer's perspective. In any case, the idea is to look at this from a small-scale farmer's point of view and consider a cost what they consider a cost. This applies both in the cases where the question is e.g. about time spent in a particular way, which in principle could have been spent differently, thereby in theory representing a (lost) opportunity; as well as in the cases where the question is one of shadow value, e.g. by using my own seed, I loose the opportunity of selling it instead, i.e. this is the real cost of using own seed. Most of the farmers interviewed see it as a cost, if they have to acquire seed from someone else, whereas the common perception of using

own seed is, that it is "free". Therefore, notwithstanding that economic theory would look differently at this; in as far as represents a farmer perspective, this does not constitute a transaction cost. Economists may well disagree with this perspective; however, within an ethnographical framework there is no other way to address this.

Observed– unobserved costs

Transactions with the formal seed sector in the study region are few and far between, which means that it has not been possible to study this in any great detail, as the study was carried out with a limited number of informants. The unobserved costs, i.e. of formal seed sector transactions or non-local transactions, could potentially be relatively high; however, at this point in time data is not available to document this. In a quantitative survey with many informants this may be approached more easily.

What is the desired good in the transactions?

The transaction costs are related to the costs of obtaining the 'desired good'. It could be argued that the desired good is a 'bagful of maize seed'. However, the farmer is not looking for seed per se, but rather for an input in the crop production cycle. In that sense the desired product is a successful harvest which yields grain and fodder of the desired quality. In relation to seed acquisitions, therefore, the farmer wants seed that will perform successfully under the production conditions present in a particular field, and which produces maize grain with the particular qualities desired by the farmer in terms of consumption qualities, storageability, marketing etc.

However, the farmers know that simply by looking at the seed, it is not possible to tell under which conditions, it will perform well or if it will germinate at all – i.e. seed is not transparent (Morris 1998). When acquiring seed, if the farmer is uncertain as to whether it will live up to the expectations mentioned above, he/she runs the risk that the acquired good may not actually be the desired good. The problem is that the farmer will not know this until he/she plants the seed. In the following this is referred to as the problem of inadequate seed. It should be noted that this can mean either maize seed that is not adapted to the given environmental or management circumstances, or, seed which produces maize that lacks the particular consumption characteristics the farmer sought at the moment of acquiring the seed.

From an economic point of view, we may want to separate the seed transaction from the rest of the production process, but for the farmer these are inseparable; he or she does not procure seed unless it is with the specific purpose of obtaining a harvest. Furthermore, the farmers correctly draw attention to the fact that the problem of inadequate seed arises in the moment of acquiring the seed, and not at some later stage in the crop production cycle. As such, both from a farmer's point of view as well as from an economic point of view, I would argue that the risk of crop failure due to inadequate seed should be considered a transaction cost, - the same way risk of getting the wrong product due to lack of information would be considered a transaction cost. Meanwhile, it should be kept in mind that crop failure may also be caused by a series of other factors, e.g. drought, pests, disease or other, in which case it would be a production cost.

Methodology

The interviews for the first phase of the present study were carried out in the communities of San Pablo Huitzo and Santa Ana Zegache in the Central Valleys of Oaxaca. Both communities were part of the study area for previous research by CIMMYT in this region. From 1997–2002 CIMMYT collaborated with Instituto Nacional de Investigaciones Forestales Agrícolas y Pecuarias (INIFAP) in a research project aiming to determine the possibility of improving maize productivity while maintaining genetic diversity (Bellon et al. 2003a; Smale et al. 1999). This project involved a socio-economic baseline study in six communities as well as research into farmers' seed selection and storage (Mendoza 2000). Another research project, funded by CAPRi (2000-2003) focused on the role of collective action for the conservation of on-farm genetic diversity of maize (Badstue et al. 2003a,b). This study contained a strong ethnographic component and involved ethnographic interviews and case studies as well as a seed flow tracer study following maize seed exchanges between farm households. A substantial body of background information about both communities was therefore readily available.

The six communities included in the CIMMYT/INIFAP project were originally selected for their contrasting characteristics in terms of maize yield potential and dependency on non-farm income (Smale et al., 1999). For the first phase of the present study it was not possible to work in all six communities due to the labor intensive and time consuming character of the ethnographic research methodology and the limited time span available (3 months). The two communities with the most contrasting conditions of the six, Santa Ana Zegache and San Pablo Huitzo, were therefore selected for this study. In doing so we were able to get high quality information that sampled the range of situations present in the study area.

Data gathering took place primarily in the form of a series of informal, semi-structured ethnographic interviews with key informants from 16 households, 9 in San Pablo Huitzo and 7 in Santa Ana Zegache. A table with a brief description of the informants is enclosed in annex 1. An informal interview guide was used and the interviews were tape recorded. The themes covered included: the kind of information farmers considered important about the seed and/or the seed provider; how to get this information? what determines what type of transaction is used and the costs involved; whether or not possibilities for compensation exist in case the seed does not live up to expectations?

Information gathered during CIMMYT's previous research activities in the two communities was used to select the informants for this study, particularly information from the seed flow tracer study with a sample of 50 household per community (Badstue et al. 2003b) and the baseline study with a random sample of 40 households per community (Smale et al. 1999). Based on this information, in each of the two communities the informants were selected in order to represent different social groups in terms of gender, ethnicity, economic status, and level of formal education.

The results presented below therefore stem from a combination of a new series of ethnographic interviews with key informant, specifically focusing on the issues of farmers' transaction costs when acquiring seed, as well as from previously gathered background information and in-depth knowledge about the seed system in these two and other communities in the region.

The study area

Mexico is a center of domestication and diversity for maize (Matsuoka et al. 2002; Piperno and Flannery 2001; Sanchez et al. 2000a,b). Maize agriculture continues to play a significant role in the livelihoods of Oaxacan small-scale farmers as a source of household food security, appreciated local maize products such as tamales and tlayudas, and as a source of income. Farmers in this region value their landraces and continue to plant them, and by doing so they contribute to the conservation of maize biodiversity (Bellon et al. 2003a; Smale et al. 2003). The vast majority of maize grown in this region are local landraces, for example, in six communities in this region improved varieties made up only 1 % of total area planted to maize according to Smale et al. (1999). Therefore, unless other is mentioned, 'maize' in this document refers to *maiz criollo* i.e. farmer varieties[1].

The communities of San Pablo Huitzo and Santa Ana Zegache are both situated in the Central Valleys of Oaxaca. Yearly medium temperature in this region is 18-22 C with an average annual precipitation between 600-1000 mm (INEGI, 2001a) falling mainly from May-October. The mean farm size in San Pablo Huitzo as per 1996 was 2.44 ha and in Santa Ana Zegache 3.46 ha (Smale et al. 1999). Maize, beans, and squash are the most common crops, and farming systems in both communities are characterized by very low productivity (Smale et al. 1999).

San Pablo Huitzo belongs to the District of San Agustin Etla in the Valley of Etla at 1,700 masl. Average farm size in Huitzo is 2.44 ha (Smale et al. 1999). The use of tractors for land preparation is relatively common here, and besides the basic grains mentioned above, alfalfa is also grown for fodder, as milk production is important. Some farmers also grow vegetables for the market and some inhabitants work as skilled or day laborers within or outside the community. In comparison to Santa Ana Zegache, San Pablo Huitzo has a slightly more stable and mild climate, relatively better soils, and a considerably larger irrigated area, favoring more intensive agriculture. Finally, San Pablo Huitzo also benefits from its close proximity to the Puebla-Oaxaca highway.

Santa Ana Zegache belongs to the district of Ocotlán in the Valley of Ejutla at 1,480 masl. Average farm size in Zegache is 3.46 ha, and the area is characterized by poor soils and scarce rainfall. Only 3% of farms have any irrigation, as opposed to 85% of farms in Huitzo (Smale et al. 1999). Like in San Pablo Huitzo, alfalfa is also cultivated in Zegache, although on a much smaller scale. Some farmers also cultivate castor beans (*Ricinus communis*), flowers, garlic, and groundnuts. Even though the community is situated some distance from main transportation roads, access by bus to urban centers like Oaxaca (1-1½ hours) and Ocotlán (30-45 minutes) is fairly easy. Contrary to San Pablo Huitzo, whose population is almost exclusively mestizo and Spanish-speaking only, a large part of the population in Santa Ana Zegache (>30% (INEGI, 2001b)) belongs to the ethnic group known as Zapotecos, and speak Zapotec as well as Spanish.

[1] *Farmer varieties* (referred to as "varieties" in this paper) are the crop populations that a group of farmers recognize as distinct units. Each variety combines a particular set of characteristics that farmers recognize, such as yield potential, growth cycle, performance under biotic and abiotic stresses, response to management, or culinary and storage properties (Bellon 1996; Smale and Bellon 1999). While they may be recognized as distinct, varieties may not have specific names beyond the color of the kernel, i.e. , two distinct white maize varieties might both be called "whites" or blancos. This definition differs from the definition used by the Union for the Protection of New Varieties and Plants (UPOV 1991) according to which a variety should be distinct, uniform and stable.

San Pablo Huitzo and Santa Ana Zegache each constitute municipalities headed by a municipal president and a body of counselors. Both have electricity and drinking water, some medical services, and are relatively well connected by public transport to nearby regional markets[2]. Likewise, both have a primary school and San Pablo Huitzo furthermore has a secondary school, while Santa Ana Zegache counts with a *tele-secundaria* (a national secondary school program via television). Agriculture and maize in particular remain very important to people in these two communities, even though their agricultural resources are limited and they also depend on other sources of income. No public extension service exists for farmers in these communities and any agricultural extension in the region is sporadic. On the occasions where e.g. talks on agricultural issues take place at community level, they are generally organized by political groups.

In both communities maize production is primarily for household consumption. Those who produce a surplus of maize grain[3] often choose to sell this in smaller portions at nearby retail markets, where the local landrace maize is thought to be the best and the one most buyers prefer for human consumption. Wholesale options do exist, but require large quantities of maize and transport cost can be considerable.

Selecting seed from one's previous maize harvest and carefully saving it for the next planting season is a widespread practice among farmers both in San Pablo Huitzo and in Santa Ana Zegache. Many farmers set aside more seed than they calculate they will need for their own planting. This provides a buffer against seed loss in storage as well as the possibility to provide seed should another farmer approach them with this request. In the case of sharecropping, which is a common arrangement, the standard procedure is that the landowner provides the land and the seed, while the sharecropper does the work.

Findings:

Search costs

In general, searching for information is one situation in which farmers draw on their various social networks. The access to information etc. is heavily influenced by the nature of one's networks of social relations, as well as the farmers own social and political standing or connectedness. Physical isolation can also influence the flow of information, i.e. the further away from the village the less flow of information. In many respects this is the case of Francisco and the other farmers in Rio Blanco who live and farm in the hills several hours travel from the village of San Pablo Huitzo. Still, much also depends on the personality and skills of the individual farmer. For example: As an extremely poor, illiterate, Zapotec, single woman, Miriam is marginalized in a series of respects, and her participation in ordinary social life, local social institutions and other common fora for information is limited. Nevertheless, Miriam seeks to

[2] For Santa Ana Zegache: Ocotlan (aprox. 10km) and Oaxaca (aprox. 45 km); for San Pablo Huitzo: Etla (aprox. 20 km) and Oaxaca (aprox. 40 km).

[3] No evidence was found in this study, that marketing maize grain surplus makes farmers act differently in the seed market i.e. buy hybrid seed.

manage as best she can, using her other social skills and resources in order to acquire information (chatting in the maize mill, cultivating the relationships with the farmers she works for as a day laborer, doing other people little favors when she can etc.). Of course those who enjoy social or political standing and/or have many skills are particularly fortunate, whereas the opposite could be said about those who have neither.

How do people get information on seed traits?

When maize growing smallholders in the Central Valleys of Oaxaca want to acquire new maize seed[4], they look for maize varieties with traits that relate to their particular production conditions and consumption preferences. This is similar to what others have found elsewhere in Mexico and abroad (Bellon 2004; Almekinders, Louwaars and de Bruijn al 1994; Linnemann and de Bruyn 1987). The local maize taxonomy in the region is based mainly on grain color, grain width, and the time for maturing, and in previous CIMMYT studies it has been found not to reflect fully the actual maize diversity present in the region (Smale et al 1999)[5]. It is therefore relevant to ask in what other ways farmers obtain information on seed traits. Through the interviews several ways used by farmers for gathering information about seed traits were identified:

Observation

A common form of obtaining information is through direct observation of maize in other farmers' fields. According to informants, farmers gather information when moving about in their communities while paying attention to the crops other people grow, their performance, management and growing conditions.

For example, farmer Camilo from San Pablo Huitzo explains that when the maize plants are mature, he will usually 'do a round' - just to see. "One must go and look" he says "one must see, that this maize is good, I like this maize … I am going to see the person who planted this maize….".

In Camilo's experience yellow maize can be difficult to sell so last year he decided to acquire seed of white maize from Don Luis. When asked how he found out about the kind of maize that Luis grows and its characteristics, Camilo answered: "Well, we are on friendly terms. A son of his married one of my sisters, so it's like family. Whenever I dropped by I would notice the type of maize he had and I liked it. … So I saw the maize and the type of ear and everything, and I liked the maize. As it was very good, I decided I was going to get this one".

[4] The main reasons for seed acquisitions cited by maize farmers in a seed flow tracer study, which formed part of another CIMMYT research project in the region, were experimentation and lack of sufficient seed. In a few cases seed acquisition was associated with seed exchange between farmers or as presents. This, as well as farmers reasons for saving own seed, has been described in detail elsewhere (Badstue et al. 2003 b).

[5] The lack of a commonly recognized and clearly defined local nomenclature for local maize diversity, which goes beyond grain color, width, and time for maturing was confirmed by both Zapotec and Spanish speaking farmers from the study communities during interviews and focus group discussions.

Similar to Camilo, the way farmer Pablo L. gets information is by being observant and asking questions. Pedro often works land, which belong to other people, either as a sharecropping arrangement, renting or pawning. If any of this land is under irrigation he sometimes plants hybrid maize H311 on it, which he then sells for silage. He first learnt about this variety some 18 years ago, when one day he noticed a particularly good looking crop. "I saw a maize crop, - so uniform this crop and the ears…! I went and talked with [the owner] and I asked him what kind of maize that was, if it was a criollo. And he said 'No, that is a hybrid maize. Look' he said 'if you want to plant this, ask for the number 311'. And where do I get it? 'In Oaxaca' he says, 'in those shops where they sell pesticides.'

Conversation

Talking to other farmers, family relations etc. is another common way of getting information about seed traits. According to Lorenzo this is an effective way to get information about the characteristics of a certain kind of maize seed: "You get along talking, one asks questions. I ask the other guy, say, 'How come this maize looks so good?' 'Because I have a well', he says, 'I have irrigation'. So, you may want to buy this maize if you have irrigation, but as it comes from seed that was irrigated, I tell you, it will not succeed where there is no irrigation".

Informal gathering and exchange of information, through observation and everyday conversation with other farmers, is in fact so much part of life in Zegache that according to Catarina, the people who come to her for maize seed already know the kind of maize she has. Nevertheless, some will ask if it was fertilized with manure [as opposed to chemical fertilizer], or whether it was rain fed [as opposed to irrigated].

Farmer experimentation

Almost all farmers at some stage engage in some kind of informal experimentation. Some farmers are more persistent and structured in their experimentation than others, and those who are continuously on the look-out for new and interesting things may be more curious and innovative than the majority. This is not determined by age or economic standing. Rather, it seems to depend mostly on people's personality. However, it should be noted, that poverty is often accompanied by risk aversion, and that very poor farmers therefore may be somewhat more reluctant to engage in experiments that imply risk, *or*, their experiments may be of a more humble, low cost nature.
Many farmers in the study communities like to carry out their own experiments trying out seed of different crops and crop varieties. When farmers come across interesting maize material, they will often try it out on a small piece of land first, either in the field or in the backyard. Depending on the experiment's outcome and the circumstances in general, they will then decide whether or not to plant this material again on a larger piece of land. Experimenting allows farmers to see for themselves how the variety performs and if it is convenient for them, without incurring in major risks of failure if the variety does not perform.

In general maize farmers in the Central Valleys believe that if a maize variety performs well under certain agro-ecological conditions, it may not necessarily perform equally well under different conditions, - what breeders call a high genotype-by-environment interaction (Badstue et al. 2003b).

Francisco farms on common land in the mountains near Huitzo. On several occasions he has experimented with maize seed from elsewhere, mostly with small amounts of seed acquired in the Valley, but on one occasion he tried out maize seed that came all the way from Tapachula, Chiapas. “Sure, the plants grew, but they didn’t give any maize” he says. Having made this kind of experiment various times, Francisco is now convinced that the only maize that will perform well on the land he works, is the kind used by himself and the few other families from the little settlement in the woods.

In Zegache Don Teodoro and his wife Liliana also stressed the importance of the maize seed being from the same region. As Liliana pointed out, in the opposite case “One doesn’t know how this maize will perform; therefore one runs a risk planting this maize”. Like most other farmers, Teodoro and Liliana like to make their own experiments planting seed of different crops and varieties. Teodoro recalls, how, many years ago, he brought back with him from “the North” [USA] a big and beautiful maize cob. He planted the seed from it but the experiment was not successful. Liliana comments, that she has tried to plant “this long maize” that the traveling maize vendors sell from their truck, whenever they pass through the little town. “I once planted it here in the yard. It grew a lot and it had hairs on all the leaves. When the maize from around here already had elote, this one was still just growing and growing, but then the rains stopped, and it didn’t get any further, it didn’t fill. It is not the same”.

Rodolfo (San Pablo Huitzo) has also tried to plant the maize sold by the traveling maize vendors. “It just grows and is hairy. It doesn’t give anything.” When Rodolfo tries out a new kind of maize, he first plants it on a little piece of land. “If I plant it on all 12 hectares and it turns out not to perform well, then it is a case of loosing, no? Therefore I try it out on a smaller piece of land, and if God is willing that it succeeds, then I will harvest. Next year you can use it then I have faith in it. Then it is easier to plant it on all the land; then I know that it works on this land.” The maize that Rodolfo and his extended family now grow on the various hectares of common lands they cultivate was said to come from Ocotlán. They first tried it out on a smaller piece of land, and after a few years they liked it so much, that they abandoned the type of maize they grew before. Now the maize from Ocotlán is their only maize.

This year (2003), when the maize plants were well on their way, a drought set in causing severe damage to Camilo’s maize crop. He now regrets having planted all his land in the valley with the new white maize, leaving only a smaller plot of yellow maize up on the hill sides. This was also severely affected by the drought and Camilo reckons that he has lost the seed of the yellow maize. “I regret to have lost it now, because that one would always succeed, my land had already appropriated itself of this maize. This time I planted this white maize and it is not the same. It did not succeed; it didn’t go well with the type of land”. In order to recuperate his yellow maize Camilo says: “I am going to see the people I have sold seed to in the past and see if they still plant it.”

Farmers’ experiments with maize seed in the Central Valleys of Oaxaca most often consist in planting small amounts of seed, of maize unknown to the farmer, to see if it germinates, how it performs and compares to the farmer’s own maize. Comparison may be in a variety of aspects, ranging from production, consumption, storage and marketing issues.

How do people get information on seed quality?

Seed quality

Seed quality is constituted by a range of factors (e.g. free from damage by pests and diseases, age, appropriate storage etc.), which all have a bearing on the viability of the seed. At the end of the day it all comes down to the ability of the seed to germinate. In terms of seed quality, this is what counts at the farmer's level.

As mentioned above, seed is not transparent (Morris 1998) - one cannot know the traits and performance of the plants that will grow from it merely by looking at the seed before planting. Still, by looking at the seed farmers can check immediately observable features, e.g. physical damage to the seed, but apart from this seed quality can be difficult to determine. Age, pathogens, or inappropriate storage may affect germination, however, this is not necessarily visible to the human eye, and though farmers usually inspect the seed before acquisition, in these regards farmers in the Central Valleys must rely on the information given to them by the seed provider.

Farmer seed criteria: clean and undamaged

From a biological point of view any healthy maize kernel could serve as seed or as food. However, farmers in the Central Valleys distinguish between seed and grain, seed being a specially selected category consisting only of "best quality" maize kernels (large uniform size, clean, undamaged by pests or other), whereas grain is a mixed category, albeit with a certain minimum quality control enforced at the time of de-husking.

When Eduardo was asked how to make sure that the seed will germinate, he answered "That is a lottery, I could not be certain". Like him, most farmers recognize that there is almost always some element of risk, however little, that the seed will not germinate. However, to limit this risk farmers apply certain criteria when they select their own seed and if they acquire seed from elsewhere, they usually inspect the seed before striking a deal.

To a certain extent the criteria behind farmers' definition of seed (specially selected, large uniform seed, clean, undamaged by insects or other) protect against some of the factors that may affect germination. For example, all farmers stressed that the seed must be clean and intact, i.e. it should not be stained or show any signs of mould or other and it should no be damaged by insects. Don Elías put it this way: "That it is clean. The one that has insect damage: No". In the latter case, explains Pablo H., the seed will not germinate. He adds that when inspecting seed, he breaks one to see if the "puntito" [pointy end] is intact. In the opposite case, or if the seed disintegrates by itself, it is no good, he explains.

Along similar lines Miriam explains: "As long as it has its little heart, the white part in the middle, it has to germinate. Look, like this little maize grain, this little heart, and this is where the little maize plant will start ….." Likewise Liliana says one must make sure that the seed has been specially selected, is clean and undamaged by insects. Like Miriam, Liliana points out that the "heart" of the maize seed must be intact. "That one will germinate", she says.

Once in a while Pablo L. acquires small amounts of hybrid maize seed. He is extra careful after a bad experience buying seed from the local agro-veterinary stockist. He noticed that there were

signs of insect damage to some of the seeds, but he bought it anyway, after planting however the majority did not germinate. “I went to see the guy [at the shop] and I told him. ‘So you were right’, he said, and he gave me back what I had paid for the seed. But we still lost, because I had to start all over again, plowing the plot and planting again. “Therefore” says Pablo L., “Now, when I go to Oaxaca to buy seed, I make sure to check that it is not damaged by insects”.

The age of seed

Some farmers are aware that the age of the seed can affect germination. Some years ago, Pablo H. acquired a small quantity of hybrid maize seed through SAGARPA (Secretaria de Agricultura, Ganaderia, Desarrollo Rural, Pesca y Alimentacion). He did not use it all, and when five years later he planted what was left over of the seed, it did not germinate. Don Pedro reflects on this and comments: “In the stores where they sell [seed], it sometimes happens that they have already had it stored there for a long time. That ‘s when this sort of thing can happen. They buy in big quantities, so they sometimes have some left over.” He mentions that this happened to him on another occasion, not with maize, but with onion seed. After much arguing with the stockist who had sold him the seed, he was compensated with another tin of onion seed.

Unless the seed comes in a sealed package with proper labeling, it can be difficult to know how old the seed is. However, Pablo L. explains that he checks whether the pointed end of the maize seed looks fresh. “The bellybutton, the pointy bit, must look fresh. If it is getting old, the pointy end of the kernel, where it is fixed to the cob, looks blackish. That is a sign that it is getting old.”

This is similar to what Camilo says he has learnt from the older generation: “If the “patita” [the pedicel or pointy bit connecting the kernel to the cob] is black or spotted, they say it is no good. Then they say ‘this maize no longer works.’ The maize kernel must be clean. It cannot be spotted.” Camilo adds that if the maize kernels are clean and free of spots it is an indicator that it is maize seed from the previous year.

Trust

Although farmers inspect the seed before acquiring it, thereby limiting the chance of bad seed quality, this does not provide a guarantee that the seed will germinate. In various regards, farmers must still rely on the information given by the seed provider and depend on its’ trustworthiness. This constitutes an important reason for farmers to prefer to acquire seed from somebody they know and trust.

This year in Francisca’s household they bought seed from farmer Miguel. Francisca explains that her father knows the type of seed, and that he has planted that same kind of maize on other occasions. He also knows Miguel quite well and furthermore had noticed Miguel’s maize crop in the field the previous cycle. He therefore felt confident the seed Miguel would sell him would be of good quality.

Similarly, according to Don Lorenzo it is not wise to buy seed from somebody one does not know; “These days, there is a lot of cheating. It is not safe. Therefore one goes where there is trust”. Lorenzo is particularly suspicious about buying seed at the marketplace. He has heard people talk about a liquid that can be used to protect the maize against insect attacks. The liquid

makes the maize so hard that grain borers cannot eat it. However, he claims to have heard that if it is used on maize seed, the same hardness will prevent the seed form germinating. "That is why people bite the maize seed: '…this seed is very hard! What have they treated it with? I think it has been treated!'"

Like several of the other farmers who work full time in agriculture (eg. Pablo H., Jorge, Eucario) Lorenzo also insists, that in order to produce good seed, the quality of the work of the farmer who provides the seed is important, e.g. whether the farmer keeps the milpa clean of weeds or not. "Es que, hay gente que no saben trabajar!" he exclaims (…some people don't know how to work [well]).

When "grain" is used as seed

For various reasons, such as lack of resources, chance or emergency, farmers will sometimes acquire maize grain and then use it as seed. However, in that case it is customary to carefully sort the kernels, selecting the 'best' for seed; that way achieving some minimum quality control similar to normal farmer seed selection. This is not uncommon, and some farmers, when asked for seed, will offer their grain if they do not have enough seed to share with others, e.g. Pablo H. (see below).

Germination rates

To our knowledge no farmers test for germination[6], which, in theory could diminish the risk. During previous research activities CIMMYT researchers determined the germination rates of farmer maize seed samples collected in 15 communities of the Central Valleys of Oaxaca and six communities in the coast of Oaxaca and the Frailesca region in Chiapas respectively (Table 1). Clearly the average germination rates and even the maximum are low compared to what one should expect from certified seed (above 90%). This is not considered a serious problem however, since farmers seem to compensate for it by planting several seeds per hole when planting.

Table 1 here.

Where to get the seed? How do people know where to find seed?

Conversation

Among farmers in the Central Valleys of Oaxaca maize is a frequent topic of everyday conversation for both men and women. Usually, a few people are known always to have and be

[6] It is not uncommon for farmers in these communities to carry out little backyard experiments with seed of different kinds (maize or other) "to see if it germinates" ("para ver si nace"). However, this is very different from checking seed germination rate in a systematic way as a preventive measure towards germination failure, e.g. through a basic germination rate test among scientists commonly referred to as "rag-doll" (D. Jeffers, CIMMYT, personal communication).

willing to sell maize grain or seed. However, none of them actively advertises this and while of course this may supplement the household income, it hardly constitutes an important part of their income generation.

Informal conversation is one of the best ways of obtaining information. Francisca talks about her father, Don Ildefonso, who is in charge of the distribution of irrigation water from the dam near Huitzo. "He has a lot of dialogue with the farmers, those who use irrigation. When he moves around distributing the water, he asks them, 'Who has maize seed' or 'what do I do, I want to plant this and that!' That's the way he gets to know."

Though not from the same community, Josefina and Eduardo say almost the same: "We talk, and people will tell each other where there is seed, 'You wouldn't know who has [seed] because I am going to plant.'" This year Josefina and Eduardo planted black maize on one plot because the ideal planting time for their usual white maize had passed. One day at the market in Oaxaca selling maize, they met another señora from the village. Eduardo says: "My wife asked her, 'Listen' she says 'would you happen to have black maize?' 'Yes' she says, 'I do, but in the village.' 'Ah, then I will ask you to sell me a bit that we need for planting."

Referral by others

When a person is looking for a certain kind of maize seed, if a farmer cannot help, he or she will often try to refer the other to somebody else. This was what finally happened when a few days later in the village Josefina and Eduardo arrived at the woman's house: "When we got there: Aye! I ran out of it, she says, I have just sold the last, but here, my sister in law has the same'. And to make sure, she took us there, to the house of the other señora who gave us the maize seed".

Eduardo also recalls an occasion several years back when many farmers all over the valley had suffered seed loss due to a particularly bad harvest the previous year. His father still had seed. A friend from Reyes Mantecón (another village some 8 km away) came to see him and when he left, he took maize seed back with him. Later, more people from the same town came to Zegache to buy seed from Eduardo's father.

Not surprisingly the information appears to be passed from one to another when people talk. As Catarina explains: "People come to ask you, or they ask somebody else." This is confirmed during the interview with Francisca: "They come to look for him [Ildefonso], 'you wouldn't happen to know who has maize seed?' and then we tell them, 'At my uncle's they still have.' We are very communicative people. Here we don't need newspapers, we communicate faster than the newspapers. And those who acquire seed, others will ask them in turn. "Where did you get it?' Then they tell them, the chain develops quickly, then they arrive. That's the way."

Even Francisco who lives and works in the hills on the common land belonging to Huitzo describes the flow of information in a similar fashion. Once in a while people will ask him for seed, people who live in the village or elsewhere, but who farms a piece of land up in the hills near the little settlement. According to Francisco people look for others who grow maize in similar circumstances as themselves. This once again stresses the significance that farmers attribute to the genotype-by-environment interaction.

The maize mill
The maize mill is another forum where farmers learn who has what types of maize Women gather here every day, each one bringing her nixtamal (cooked maize ready for milling). While each one waits for her turn, the time is spent talking and meanwhile the various nixtamals of different kinds of maize can be admired and the quality of the dough can be assessed as it is milled and gathered.

For Miriam, the maize mill is the place for finding out who has what kind of maize. "That is where one can see. You ask, you see, 'Aye, what a beautiful negrito [black maize] you have! Will you sell me one almud [aprox. 4 kg]?' 'Yes! Of course, I will'. So you go to make sure, you go to their house, the people will sell, yes. It is the same with the amarillo [yellow maize]; you see it at the mill, that is the person you ask. 'If she has more? If she will sell some'."

As a man Don Lorenzo rarely, if ever, sets foot in the maize mill. Nevertheless, it is one of the first sources of information he mentions when asked about how people find out who plants what kind of maize. When Frida, his wife, brings *nixtamal* to the maize mill, other women will sometimes notice. "They ask her, 'Do you have…' That's where they notice, the women. The señora tells me. They are talking, having a good time, saying what [kinds of maize] they have."

Like most women in the traditional villages, Doña Liliana also goes to the maize mill on a regular basis. "There you see. They bring nixtamal of belatove, negrito, amarillo, all kinds. There you ask the señoras: Will you exchange maize seed with me? Or will you sell some? Just like that." Doña Liliana adds that the people, she meets at the maize mill are all from the village and most of them know each other. Nevertheless, like many others e.g. Camilo or Pablo L. as mentioned above, Doña Liliana also points out, that one can also find out what kinds of maize people cultivate by paying attention when working or walking through the fields, and then noticing to whom a certain field belongs.

Other
Finally there are other ways or sources of information through which, people become aware of who has what kind of maize seed. At some stage in San Pablo Huitzo for example, a loudspeaker was used by a local merchant to announce the sale of seed. Another good source of this kind of information are the women who make tortillas or other maize dishes for sale, either because they buy maize from others or because people bring them maize to use for a particular order.

How to acquire knowledge about the other party?

Choosing people you know
In as far as the question is about the reputation of the seed provider most people tackle the issue by acquiring seed from people they know. Don Lorenzo's statement above is an example of this, as is the comment by Ildefonso's old mother, Doña Sofia, who pointed out, that when acquiring seed, whether maize or bean seed, it is best to acquire it in one's own neighborhood so that one knows the seed provider quite well and can count on the seed to be good. ("para que se conozca y para que sea buen maíz para volverlo a tapar.")

However, Pablo L. acknowledges that there is always a certain element of suspicion that someone will try to take advantage by selling [maize] grain, pretending it is [maize] seed, although it really is not, or by selling seed left over from the previous year. "That is where one looses confidence and prefers to go to [a friend]." Pedro mentions a couple of farmers, who plant and harvest considerable amounts of maize. "Right now, they must still have maize from two years back. So…not many people buy seed from them…We, and most other people, finished all the maize and only have maize from this year's harvest." The point is the risk that one may acquire seed, which has already lost some of its germination ability, an issue the owner may well be aware of. "Sometimes they will inform people on their own initiative, saying for example 'Now I no longer have maize from two years ago, now I only have fresh [maize]'. The truth is they have really good maize. But sometimes it's the lack of confidence, like, if one does not have maize [seed], 'what if they sell me the one from two years ago…?'".

According to Doña Liliana, people who are rumored to be reluctant to help others are not popular: "Some people are like that, they don't want to exchange maize [seed], they don't want to sell their maize [seed]. They have no need. They don't trust others. Therefore other people don't like them. Yes, some people are that way." Dona Lucia is saying that some people are difficult and unpleasant to deal with. In theory, this could represent a transaction cost in terms of humiliation and embarrassment, if one approached them in order to acquire maize seed from them. However, as long as farmers prefer to acquire seed from people they know and trust, this does not represent any addition to farmers' transaction costs in relation to seed acquisition.

Farmer versus salesman

Those who are recognized as "good farmers" with good maize germplasm tend to be sought out by others as seed providers. The notion of "good farmer" refers to someone who works well and has good maize, knows how to select and save seed and has a sense of social responsibility and is willing to help others.

In order to know what kind of farmer somebody is, Pablo H. points out that one must pay attention to the way the person lives and works. He adds that this is only possible living in the village, as people in the village know each other and each other's ways.
According to Pablo H. it is best to acquire seed from another farmer who is known to be fully dedicated to agriculture. It should not be from someone who buys and sells grain (i.e. as a business), because then there is always a risk, e.g. of getting old or mixed seed.

"In my case, for example, I work in the field, I have my seed, I have my maize, I do not need to buy in order to sell. If I sell anything I have produced it myself. I know what I am selling. And when there is no more maize seed left, what I say to people here is, 'I do not have actual maize seed [specially selected], but I have maize for consumption which is also good. It is big, it is from last year, it is clean.' 'Ah, if it is good, then let me buy some of that'. But that way I do not cheat people." But a farmer who is also a salesman may be tempted to mix his maize harvest with another poorer kind of maize in order to earn an extra profit. Contrary to this, says Don Pedro, one can count on what is sold by the real farmer who does not have any kind of business on the side.

Discussing the issue of knowledge of the seed provider, Pablo L. compares seed acquisition in the village with buying seed at the market in Oaxaca, "No! In the city it is much more commercialized. They want to sell!" In the village, on the other hand, he continues: "There is confidence among people – among fellow farmers, friends. One will say, 'Look, this maize I harvested two years ago. If you want, take it, but I am not certain it will develop well."

In principle the price is negotiable (more on this below). In this case the price is likely to be that of grain – as the maize kernels referred to are from yesteryear, it is not likely to be sold as seed (due to the rapid decline in maize seed viability under ordinary storage conditions). This does not exclude the possibility that someone would use it as seed. The point here is not so much the price as the trust or confidence that one will not be cheated; i.e. that the seed provider will be honest with you, as mentioned by the informant.

Through a third party

In the case where people do not know each other beforehand, but both are from the village, they usually have a relation with a third party in common. This facilitates the transaction, like in the case of Eduardo and Josefina, where their friend even went with them and introduced them to her sister in law, from whom they then purchased seed.

Negotiation costs

How is the negotiation for seed done?

Various factors influence the terms of a seed transaction. The type of transaction and the price or exchange must be defined. Both may depend on the type of social relation between the seed provider and the person requesting the seed, or the knowledge one may have about the other - particularly the seed provider about the person asking for seed. Furthermore the time and the demand of seed may influence the price in the case of purchase.

Below, I will first present the findings relevant to the negotiation of what type of transaction to use, ordered by type of transaction. Then follow findings relevant to the negotiation of the price or exchange rate. Finally this section ends with a few remarks regarding the influence of the reputation of each party in the outcome.

Type of transaction

Purchase is the form of transaction least dependent on the social relation between the two parties. In fact farmers in general say that this type of transaction can be done with any person. This is confirmed by the findings from previous CIMMYT studies in the region (Badstue et al. 2003b). The exception would be the farmers who will only distribute seed to other farmers if they are confident that this other person will observe the general norm of taking good care of the seed and be very careful not to loose it again (Badstue et al 2003a). Of all the farmers interviewed for this study in particular, none had any reservations with regards to selling seed to others, provided they could spare the seed and were appropriately compensated. In Francisca's household for example, they cannot spare much maize, whether grain or seed, and in general they do not sell. Only if

another family member or a very close friend asks, "but then just 2 – 3 kilos, no more" says Francisca.

According to Pablo H. the person who needs to acquire seed will approach a possible seed provider; "Then he asks: 'If you will sell me a bit of maize seed?' One then says yes or no. If there is seed, then 'yes, only, you will have to pay so and so'. And if there is not, then one says 'I haven't got any [seed], but I have maize grain, but it is good, it is big, almost the same as the seed.' Then it's up to the other person".

It should be pointed out that in this region the price of local maize seed is about two times the price of grain (Smale et al. 1999), while the price of a commercial hybrid will be in the order of 8 -10 times the price of grain[7]. The issue of price negotiation is treated below.

Lending seed. Some types of seed transactions are normally only done with people the seed provider knows and trusts. The least common is lending, i.e. the seed provider hands over the seed and is promised by the receiver, that he/she will give back the same quantity and quality of seed, once the harvest is ready; or as Camilo put it: "You give it to me now, and when I harvest I will replace it to you!". This type of transaction is not very common and is usually restricted to very close friends, compadres[8] or kinship relations. Catarina, for example, was very clear on this: "Only with my mom."

Informants stress the issue of trust as very important in this case. "That's where people's friendships come in – not just anybody is going to lend you something like that. It will be because they trust you are going to give it back" says Pablo L. The reason is obvious: this type of transaction implies a risk for the seed provider that the receiver of the seed will forget, or not be able to fulfill his/her part of the deal, i.e. give back same quantity and quality of seed after the first harvest.

"Lending is done with family, people one knows well" says Pablo H., while offering an example of a typical dialogue: "'It's that I don't have the money! Will you lend it to me? Then, next year, I will pay you back.' 'Oh, well, you take it, then!'" Pablo H. adds: "It is not much used, very little. In my case, with people I know, who are good, who do pay, - fine. But if it is somebody I do not know, I'd rather say that I don't have any [seed], so that they don't take my seed without ever paying me." Liliana and Teodoro's comments were similar: lending of seed is only done with family or compadres. Liliana recalls that in the past she would lend maize seed once in a while, but that some people never pay. Now she does not want to lend seed. She mentions a

[7] Hybrid seed costs several times the price of local seed and can normally not be acquired in the communities. However, the price of the seed, - whether land race, hybrid or other, is still minimum compared to other production costs, i.e. though probably the most important input, the seed is also one of the cheapest. Nevertheless, farmers often state the price of hybrid seed as a reason for not using it. Furthermore, farmers normally emphasize that hybrid varieties need more water than local maize landraces. Finally, but maybe most importantly, these farmers prefer local landraces for own consumption. When hybrids are sown, it is mostly for animal fodder or, in smaller quantities, for *elotes*, i.e. corn-on-the-cob, a popular snack.

[8] From the word c*ompadrazgo,* referring to a ritual kinship somewhat similar to the relation known elsewhere as godparents, through which close relations of loyalty, mutual help, reciprocity, and confidence are established and formalized. Often there is a certain degree of prestige associated with being asked to become someone's compadre or comadre, and in some ways compadrazgo can signify social capital (Cordero Avendaño de Durand 1997).

person who borrowed seed from her 4 or 5 years ago, and who still has not paid it back. “People don’t remember, that someone did them a favor”, she says, “‘now when I harvest I will give it back to them: No! Nothing, nothing!”

In Huitzo lending seems to be even less common than in Zegache. This was emphasized with Francisca’s comment: “We are loosing that custom of ‘lend me the seed and I will pay you back when [the crop] is ready’. No. Here, he who doesn’t have seed buys it.”

Exchanging seed. Another type of transaction is exchange of seed. Josefina explains this transaction in the following way: “If you bring one almud of white maize[seed], we will exchange it for one almud of black maize[seed] – “a cambio” (in exchange). If one wants black, if one wants yellow, belatove…the color one wants, you go and bring your maize[seed].

Exchange appears to be less problematic than lending. The “handover” and ‘payment’ takes place at the same time, and the seed provider avoids the risk of not being paid. Nevertheless, judging from these and other interviews many seed providers still have some reservations with exchange. The issue seems to be the uncertainty of whether what the seed provider receives in return for his/her seed is of a satisfactory quality. The majority of the farmers interviewed insisted, that exchange must be equal quantity and equal quality, e.g. Camilo: “Seed I receive – seed I must give! The same. That’s why it is called exchange!”, or Liliana, when asked if it is possible to obtain seed in exchange for a comparatively larger quantity of grain: “No, no, no! The same! The same quantity!” In order to avoid this problem informants therefore explain, that this type of transactions is best done with close friends and kin (gente de confianza) in which case one can rest assured, they will give a good product in return for what they receive. Furthermore, as mentioned elsewhere above, people often know each others maize, ways of working etc. Therefore, by agreeing to do exchange with someone one knows, the seed provider has at least some sort of idea of what to expect in return.

Catarina says, she will change seed if the maize the other person brings is of good quality (i.e. seed quality). However, if it is somebody she doesn’t know very well, she prefers to sell the seed, especially after she has bad experience as the seed provider in this type of transaction. Another señora came to her house and asked for an exchange de semilla [seed exchange]. Catarina agreed and gave the señora the requested amount of seed, receiving equal quantity of another kind of maize in return. When Catarina later took a closer look at the maize she had received, she realized she had been given ordinary maize for consumption and not the fine, selected quality characteristic of seed. “That’s when you loose confidence” she says with a skeptical smile.

“Some people, although they have maize [seed], they don’t want to do exchange” says Doña Liliana. However, that is understandable, she adds, “because they may give good maize[seed], while the other person will just give them “maiz guioxito” [zapotec: small maize, i.e. for consumption]. Then it is better to sell” continues Doña Liliana, “so that they will pay [what the good one is worth]. Lorenzo’s view is similar and directly to the point: “With people one trusts. Because then you know it is safe”.

*Variations in the types of transaction***.** Of course, there are various exceptions and deviations from the general understanding of the different types of seed transactions. On other occasions during fieldwork in the Central Valleys for example, some people mentioned exchange of grain

for seed, but in different proportions so as to accommodate to the extra value of seed as specially selected. During the interviews for the present study, most, but not all, of the informants rejected this concept. Pablo H. commented that sometimes, if the other person does not have seed to give, depending on who the other person is, he gives seed anyway in a 1:1 proportion, knowing that he would receive grain in stead. “Here we know each other, we know who to give to and who not”, he says.

Leonardo sometimes practices another version of the exchange, giving seed in exchange for work. As an example Lorenzo mentions his niece who came to him for maize seed this year. Her household is humble and when they came to the issue of payment, Lorenzo told her to forget about it, and that he was going to give her the two almudes [8 kilos]. Instead he suggested that her husband come work with him some day “When he has time, he can come and give a hand.”

While selling/purchase does not seem to present a problem to most seed providers, obtaining the money to pay for the seed can be a problem for some farmers seeking seed. They may have an advantage in exchange or lending instead of purchasing. However, unless the person asking for the seed is gente de confianza [persons of confidence/trust] seed providers tend to prefer selling/purchase as the type of transaction, as this helps them avoid the risks of lack of payment or of receiving low quality kernels in return for their own specially selected seed. ”Si es alguien que uno no conoce, mejor que lo vende”, as Miriam said (“If it is somebody one doesn’t know, it is better to sell it).

Regardless of the type of transaction, it seems that both seed receivers and local seed providers favor gente de confianza as their partners in seed transactions. The fact that people are ‘gente de confianza” does not exclude purchase as the type of transaction, in fact even among kin purchase is a very frequent transaction. The relationship between the type of transaction and the type of social relation has been explained further in Badstue et al. 2003a.

As reflected in informants comments, for the person seeking seed there are furthermore important advantages in acquiring seed from someone known and trusted, e.g. besides trustworthy information, - a lot of which may already be known to the seed seeker -, easy access and possibility of preferential treatment.

Negotiation of price

Generally, it is up to the seed provider to say how much the price will be. (Pablo H., Eduardo). However, at any stage there is usually a commonly recognized price which may then vary a bit, but not much, in the individual transaction. As Francisca explained, “There is already a price, which people will know. Here the one for eating is at 3 [pesos]/kg and the one for planting is at 5 [pesos]”. Similarly Catarina said: “In the village, the price of maize for tortilla is 3 pesos and the one for seed is at 4.50 [pesos]/ kg.” Pablo L.: “You negotiate a price or [in most cases] there is already a price.”

Price information is a frequent topic of ordinary small talk, and upon returning from the market people are often asked about the prices of produce and goods. When buying/selling maize seed, the price has to be agreed upon before a transaction takes place, and unless they feel very pressed, farmers will only buy if they can accept the price, which is, of course, not necessarily the same as

being happy with it. Sometimes, therefore, if the person buying thinks the price is too high, he or she may prefer to wait and see if a better deal can be made elsewhere.

If the kernels in question were selected as seed, the seed provider will usually try to sell at the price of seed. Likewise, if the kernels were not selected as seed they are likely to go at the price of grain. However, depending on the situation the seller may want to try to pass it off as seed. - This is where the negotiation comes in. Alternatively, if it is e.g. his brother who requests the seed/grain, the provider may just give it to him for free! The following table shows producer and consumer prices for maize seed and grain in three communities in the region.

Table 2 here.

Price fluctuation. Both seed and grain prices fluctuate during the course of the year. According to informants, grain prices start climbing between planting and harvest, when many people's grain reserves run out. Meanwhile, seed is at it's most expensive when it is planting season, i.e. from around the 15th of May, until 15th of July. If the previous year was bad and many farmers lost seed, it may affect the price of seed the following year.

Like Liliana said: "[It is most expensive] when it is time for planting. When there is no harvest. But when there is a good harvest it doesn't sell." Or, as Rodolfo explained, if one is running late with the planting of some of the land and needs to acquire seed in order to finish planting in time, one may be pressed and therefore willing to pay whatever price the seed provider asks. This happened to him last year. He had already paid for a tractor to plow the piece of land and planting season was almost over. "'Let's buy, it is getting too late' I said to my son, 'If it succeeds, that's it, - if not, we can always give it to the animals'". When his daughter told him her father in law still had seed maize, Rodolfo didn't think twice before asking if they would sell seed.

Rodolfo was pressed for time and eager to finish planting. He did not care much whether this last parcel was going to succeed at producing grain or not, ("'If it succeeds, that's it, if not we can always give it to the animals'"). If he had wanted to, he could have negotiated another type of transaction, or, he could have bought seed from someone else, or, he could have chosen to use his own maize for consumption as seed or any other consumption maize he could get his hands on.

Rodolfo's daughter went to get the seed, but had to shell it herself, and they were still asked to pay 5 peso/kg (average price, but for shelled seed). Rodolfo thinks this is too much, considering the seed was not shelled and considering they are affiliated through the conjugal relation of their children (i.e. he would have expected a more favorable treatment). "As I say, we don't all have the same heart". Still, Rodolfo says, he would have taken the seed even if the price had been the double, "Even so, one will grab it – that's when you really need it!".

Haggling. Although, there is normally some generally recognized price level, the person who is acquiring the seed may try to haggle the price. However, according to various of the informants, in the end the price depends on how interested the buyer is in acquiring the seed, e.g. like in the case of Rodolfo (mentioned above) or the case of Bernardo: An acquaintance from the market in Etla had talked very favorably about his maize, and when Bernardo saw it, he liked it very much

and decided he would like to try it out on his own land. He was planning to get 10 kilos, but when they came to discussing the price and the other wanted 7 pesos/kg, Bernardo changed his mind "Why so expensive, compadre[9]? That is very expensive!' 'No, this also cost me a lot of work!" Finally they arrived at a compromise; Bernardo was going to pay 6 pesos per kg, but then he only wanted to acquire 1 almud (4 kg). Bernardo managed to negotiate the price.

So did Eduardo and Josefina when they acquired the black maize seed this year. Josefina explains: "We bought it at 18 [pesos] per almud. Yes. Because she wanted 20 [pesos], and I said 'yes, it is true, they sell it at more, but that's when they take it to Oaxaca, one has other expenses paying the bus, the bags and so on… This, on the other hand is direct…'". Eduardo adds, that this was partly due to their relation with the other woman (who introduced them to her sister in-law of whom they bought the seed) "and also because the señora (Josefina) is a bit of a haggler" he laughs. Josefina defends herself mentioning that with several children, she must be careful with the expenses, lest she might find herself without money to pay at the maize mill. "What is more" she says, "One pays back with the same coin. One remembers." ("Con la misma moneda se paga", i.e. What goes around, comes around).

Exchange and lending. In case of exchange there is less room for negotiation of 'price', at least in theory. The general understanding of the terms of this type of transaction is that category and quantity must be the same, i.e. exchange of equal amounts and quality of seed of different kinds of maize. If the seed seeker does not have seed, but has grain instead, he/she can ask for an exchange of maize grain, from which he/she must then select the best for seed. Josefina explains: "'Look, I am going to give you seed maize, because what I want is seed.' And then they do as agreed: 'Seed I receive, seed I give'. But if they agree, one can say: 'Look, I have no seed maize left, I only have tortilla maize. If you want you can select from that' – and then: you give me tortilla maize and I give you tortilla maize. But if I want seed maize, I have to give seed maize!" If somebody requests n de semilla (exchange of seed) and gives the seed provider maize which is obviously not seed quality in return for seed quality maize, it is regarded as cheating the seed provider, unless he/she was aware of and had accepted the difference in qualities. This is what happened, when Catarina agreed to exchange seed with another señora and received grain for consumption in return for her own specially selected seed (see above).

If it is a question of lending seed, the general understanding is that after the harvest the seed receiver must give back same category and amount of seed as he/she received from the seed provider. "He gave me seed, so I must give seed. Exactly! The same!" as Camilo explained. Informants made no mention of the use of interests or similar costs in relation to this type of transaction neither during this or previous CIMMYT studies in the Central Valleys.

How much does the reputation of each party play in the outcome?

First of all, when people seek seed, their first choice of seed source will be somebody they already know and feel comfortable with (Lorenzo, Camilo). If this is not possible they will seek to acquire the desired seed elsewhere, however they will not approach someone with a "bad reputation" if they can avoid it. In this context reputation does not refer to the reputation as a

[9] Here a way speaking to invoke a notion of social affiliation or closeness.

good or bad farmer, but rather to his or her approachability and willingness to interact socially. In that sense, if one's reputation is bad, e.g. bad tempered or not inclined to helping others, not many people will ask you for seed. Like Liliana said about people who have a reputation for not wanting to provide seed: "Other people don't like them." The opposite will be the case if the seed provider is known for having good maize and quality seed and for being fair and agreeable to deal with.

Not bothering to select seed. From focus group discussions and individual interviews in these and other communities in the Central Valleys of Oaxaca, we know that some farmers have a special attachment to their seed lot and need to be convinced, before distributing any of it, that any receiving farmer will take good care of the seed, i.e. appreciate it and select his/her own seed from one year to the other in order not to loose it. In the interviews for the present study, this was not directly expressed, however, it came out clearly that not bothering to select and save seed, if one had the possibility to do so, is associated with being lazy, and looked upon with disapproval. As Doña Liliana and Don Teodoro said: "No! Then people will say, 'Well, you have maize! Why do you go to buy? Work! Why do you go buying? Why do you go to buy seed? Is it that you don't work? If you work, why don't you select it yourself, then? Or is it because you are lazy that you don't have any [seed]?"

Loosing one's seed. In some ways loosing one's seed may be associated with a similar humiliation or stigma. As has been described elsewhere (Badstue et al 2003b) the practice of saving ones own seed is strongly associated with the notion of being a "good farmer", i.e. someone who takes good care of his/her seed and make every effort not to lose it. As the female farmers in one of the focus groups stated, when explaining that a good maize farmer should not loose the seed: " [losing seed]… is like hurting one's pride of being a good farmer – it is like a humiliation."

Requesting a seed transaction may therefore invoke the impression, that the person asking for seed is not a "good farmer", or at least this may be the seed seekers own perception. Some farmers will therefore try to avoid mentioning seed loss, or make a point of not having lost their seed. For example, when Catarina described her experience with the moth infested seed (see below), she deliberately emphasized that she was not acquiring seed because she had lost her own. When I made a note of this and asked Catarina about other people's attitude to farmers who loose their maize seed, she smiled, knowing exactly what the question was about "They will say to them, why they don't save seed, instead of having to ask for it all the time!"

It should be mentioned, though, that farmers in the Central Valleys generally acknowledge that bad luck can happen to anyone, and that if a certain farmer normally takes good care of the seed, but somehow happens to loose it, it appears to be fully acceptable and legitimate for him/her to obtain seed from other farmers that year. In this case, the person is someone, who has a justifiable need for the seed. Furthermore, the seed provider can rest assured, that the other farmer will "take good care" of the seed, like in the example above. In other words, this person is someone who "deserves" the favor and who will appreciate it.

The majority of all farmers in the study communities, however, observe the general practice of selecting and saving own seed from the previous harvest. Very few farmers, if any at all, do not bother to select and save seed from the previous maize harvest, and seed acquisitions from other

farmers are therefore mainly to obtain different kinds of maize seed or to make up for a partial or complete seed loss.

Seed seeker's reliability. Seed providers want a "safe" transaction. Pablo H. explains, for example, that if people want to buy, he has no reservations. On the other hand, if the person, who requests seed, wishes to borrow it, he will only agree, if it is somebody he knows can be trusted, and is able, to pay back. In the opposite case, he says "I would rather say that I have don't have any seed, and that's it. To avoid having to explain myself." Similarly, in the case of exchange, some people (e.g. Pablo H.) may give seed for grain, i.e. preferential treatment, if it is somebody they know or feel some kind of responsibility for.

Seed seeker's resources. The seed provider's knowledge about the person requesting the seed may also influence the negotiation in other ways: According to Don Rodolfo, in any kind of transaction people will take advantage and try to make you pay a good price if they know you can afford it. Nevertheless, he still acknowledges that the opposite may also apply; that a poor person will get a comparatively cheaper price. This largely depends on the personality and sense of social responsibility of the provider.

Social responsibility. Some people have a strong sense of social responsibility. Therefore, if the person seeking seed is very poor, some seed providers will take pity and give that person a favorable treatment, e.g. give maize for consumption for free to be used as seed. Like Pablo H.. said, if it is someone he knows and who is very poor, he may just do a special favor. "Se trata de ayudar", he says ("It's about helping others").

Lorenzo also made a point of the importance of being willing to help others. As mentioned above, he will sometimes accept work instead of money or other payment. "One must not be bad. Otherwise, [when you need help], people will [remember] you. The person, who treats you well, should also be treated well." He gives an example, mentioning Juvencio, a poor farmer from the community who sometimes works with Lorenzo, and who from time to time calls on Lorenzo for favors of different kinds: "'No', I say, 'when I need a hand, I'll just send the young one over to see if by any chance you have time'. Or he will let me know what day he'll be there. For my part, I wish all the people would be…. or that we would all help each other. Those who do not have, - one must help them. But like we were just saying, some people, they just take and go. They don't even remember. Well, with those people, it's just the once. Next time: no! That's where you loose confidence."

Enforcement costs

What happens when someone sells/gives seed that is not good? Is it possible to get compensation?

When Francisca was asked what happens if the seed one acquired does not germinate, her reaction was "Well, then it was not good seed! Ah, but now they will say, 'Ah, it is because you did not fertilize it!' That saves the one who provided you the seed! That's the way it is. You bought the seed. Whether it went well or not is your problem. You can't go back and complain. One takes a risk; it is one's own problem."

Judging from what other farmers said, this seems not to be an unlikely outcome. Catarina recalled an occasion when she decided to try out a kind of maize known to come from the nearby town of San Martin. She bought the seed from a vendor at the market in Ocotlán. "It wasn't that I had lost the one I had, it wasn't that I didn't have seed. I felt like trying that one. But I got so angry: I bought the palomilla[10]! It was at the market in Ocotlán, where the people from San Martin come to sell. That's where I got it. I took it home and there I left it in its bag. When I was preparing for the planting I opened the bag, and a cloud of palomilla came out! And by then the whole house was infected. Full of palomilla! I still planted it, but only a few germinated. But it looked good!" [when she bought it]. When asked whether she went to complain, Catarina exclaimed: "Aye! Just to find the one who sold it to me!! No! [Furthermore] I decided to buy it!"

Whether it is possible to get compensation seems to depend very much on the circumstances. If the seed was bought at the market, there is very little chance of compensation. As Catarina said, 'just to find the person who sold it to you is a problem". If it was bought at an agro-veterinary stockist, there is little chance, but depending on the circumstances one may actually succeed in some kind of compensation.

As mentioned earlier, when Pablo L. found that the seed he had bought at the local agro-veterinary shop was damaged by insects and only germinated in parts, he managed to make the shopkeeper compensate him for the cost of the seed. Similarly Pablo H. complained to the stockist, who had sold him a tin of onion seed that was overdue and did not germinate, and in the end he received a new tin of onion seed. Nevertheless, it requires a certain amount of confidence to take up a discussion/argument of this kind with a shopkeeper, who can always claim that it was your own decision to buy. Furthermore, even if the farmer is compensated for the cost of the seed, this may only be a small part of his/her loss.

If the seed in a recently planted field does not germinate, or if the crop is lost in the very early stage (e.g. due to weather conditions), depending on the circumstances, there may still be time to plant another maize crop in the same field, or, if it is too late for maize, another crop, e.g. chickpeas. However, whether maize or chickpeas, the land will normally have to be ploughed again. Therefore, if the maize seed does not germinate, it may not mean complete loss of crop production that year, but it will normally mean the loss of the cost of (minimum) the first land preparation, i.e. like in Pablo Lopez's case, where his loss also included the costs of the plowing of the land and the planting.

If the seed was acquired from another farmer in the same community, most informants did not believe that the seed would not be good, i.e. that compensation would at all be an issue. "In the village you know this won't happen" said Pablo H. "As long as it is not damaged by insects, that will not happen" was the comment of Josefina and Eduardo. And as Camilo said: "How can I sell you something that is not good? No, not here. Like I say, that has never happened to me. I guess because we are not people who…yes, we don't like to cheat others. One must sell good things."

[10] Grain moths, can be either of the following varieties: Angoumois grain moth (*Sitotroga cerealella* (Olivier)) and Indian-meal moth (*Ploidia interpunctella* (Hubner)), (Ortega C., 1987).

One person commented that a failure of the seeds performance would most likely be accredited to agro-ecological issues or inappropriate management. It seems clear that in most cases it would be very difficult to prove that the reason for failure was bad seed quality – furthermore having seen the seed before acquiring it, it is difficult to claim that it was not the farmers own decision to acquire it.

Does crop failure have repercussions on the reputation of the seller?

If seed is acquired which does not germinate, and it is believed that the reason for this was bad seed quality or cheating, the seed receiver will not come back for more seed in future if he/ she have other alternative sources. As Rodolfo said: "You simply don't plant that one again." What is more, the seed receiver is not likely to recommend the provider to others.

Is compensation for crop failure relevant?

Informants clearly do not consider this relevant in relation to seed acquired within the same community. On the other hand most people seem to foster a general lack of confidence when it comes to acquiring seed from strangers and market vendors. Camilo, for example, had no doubt that there is an element of risk attached to acquiring seed in the market. "And there, there is no way of complaining! First of all to find the one who sold it! And then, if they are showing me what they are selling me, well, then you can say, that it is not the vendors fault…". Francisco was equally reserved about buying seed from strangers: "They may cheat. Saying that this seed is good, that it will perform well, but when the time comes…when one wants to harvest, it didn't succeed…"

To a certain extent this also applies to agro-veterinary stockists, see Pablo H.'s comment above, that one cannot always be sure about the seed they sell. A formal seed sector has yet to develop in Oaxaca, and seed stockists are few here. Their assortment of maize varieties is limited and few small scale farmers are among their clients. The uncertainty around seed quality, which Pablo H. refers to in the above mentioned example, relates particularly to small quantity purchases. In Mexico maize seed from the formal seed sector is sold in 50 kg. bags, meaning that when a small-scale farmer acquires10 kg it is weighed out and sold without information about its expiration date.

How are contracts finalized? When is payment made?

The finalization of individual seed transactions occurs when payment is completed, e.g. "It was a case of buying-selling and that was it. Now it finished, nobody owes anything" as Francisca explained about purchase. However, in many cases the seed transaction enters in a context of mutual favors and reciprocity. Even though the individual seed transaction has been finalized the relationship of mutual help and reciprocity may continue.

The case where the seed transaction is gift or has a strong element of this (e.g. preferential treatment) the finalization may appear more blurry. If it is a gift, does it mean that you do not

owe anything? Informants differ in their responses as to whether one party owes anything in the case of gift, however, most informants if not all agree that one ought to return the favor if the need arises and one has the opportunity to do so.

Time of payment depends on the type of transaction. If it is a purchase, the payment is immediately, or, in other words the handing over of the seed is dependent on payment. "Allí mismo!" as both Pablo L., Francisca and Don Teodoro said ("Right there!"). If it is exchange, the interchange is done simultaneously, and if it is a lending, the rule of thumb is that the same quantity of seed, which was borrowed, is given back to the seed provider after the harvest.

Maize in comparison with other crops

Special attachment to maize.
Though no longer the central productive activity for the majority of Oaxacan smallholders, maize continues to figure among the most important crops for farmers in the two study communities. While farmers in Santa Ana Zegache and San Pablo Huitzo will talk about both maize and other crops with much affection and respect, "Because they are things to eat and one shouldn't disregard them, they are alive!" as Miriam explained, many of them seem to express a special attachment to maize. Miriam herself, for example, kissed the ears of maize she showed during the interview, saying "Aye, dear god! If there is no maize, what do we eat! It is the same as if there was no water – without water, what would we drink?" Eduardo used almost the same words: "Maize is like water. If there is no water, there is no life. …If there is no food, well… one is not well".

Most important food crop
Maize is the staple food. "It's the one that's eaten the most" say Josefina, "Everyday for the tortillas. It cannot be missing. Without maize – what will the tortillas be made from? Beans, on the other hand, well, there are days on which there will be something else. Sometimes there is no bread, because sometimes there is no money for bread, but there will be tortillas, - tostadas - you put the coffee on and then - everything will be all right!"

Catarina's comment is similar. Maize is more important than beans, she says, adding: "People say: 'If only the maize will succeed, then never mind the beans!' It's that beans are not for every day – they are eaten every 2-3 days. It is not as important as maize."

The relative importance of maize can also be observed in other ways. For example, most farm households plant much more maize than beans, even though some farmers (e.g. Eucario, Ismael) claim that bean cultivation is actually economically more interesting. Francisco and Liliana, for example, have always cultivated both maize and beans as well as other crops, but "we have always [planted] more maize" says Francisco.

Seed selection is another area in which maize stands out in comparison to other crops, e.g. beans or chickpeas. It is common practice among farmers in the study communities to save seed of various crops. However, whereas maize seed is specially selected and carefully stored separate from the rest of the maize, thereby constituting an altogether different category from maize grain,

a similar practice does not seem to apply for beans or chickpeas. Miriam explains: "Seed maize is bigger. The little maize kernels, the second class maize, are for eating, but in beans they are the same, there is only one class." This corresponds with Catarina's comment: "Bean [seed] are mixed, they are not selected, you throw [sow] it even if it is small" or as Liliana said: "Even though it is mixed. Yes. It is not selected." In comparison, Eduardo explained that neither beans[seed] nor chickpea[seed], are selected – "revuelto" (mixed) he stated, adding that "If you want to plant chickpeas, you just get it from anywhere."

In general consumption issues are very important in farmers seed selection in this region, as one of the primary purposes of the production is auto consumption. This aspect, however, is not absent in relation to other crops, e.g. when people choose what kind of beans to plant. Several things therefore indicate, that it is most of all the cultural significance of maize in this region, which makes maize seed so special.

Different kinds of seed transactions

Furthermore, maize seed can be acquired through various types of seed transactions, although purchase is clearly the most frequently used (Badstue et al. 2003a,b). However, at least according to the informants interviewed for this study, transactions like exchange or lending, seemed to be unheard of for chickpeas or beans, e.g. Miriam: "No! You buy it. No! Because nobody will ever change it. Maize, yes, but beans? No. That's for sure. And they are not going to give it to you as a loan either! You buy it. Sold. If you have money, you buy it, if not – no."

Again, the cultural significance of maize makes it very special. It is something very basic, imbued with meaning and symbolism – e.g. Eduardo compares maize to water. Beans and other crops on the other hand is less so and therefore need not be treated specially. At the same time, while it is more difficult for poor farmers to access beans for planting, because one has to pay for it with money, this special status of maize makes it possible for people with very limited means to still access maize for planting (or consumption) without paying for it with money, and as several of the informants emphasized, for them, maize is the more important of the two.

Embarrassment and affectional value

Interestingly, while the practice of selecting and saving seed from one year to another can be compared to a social norm in the case of maize, of which disregard is associated with a certain stigma (see above), this does not appear to happen in the case of other crops, e.g. beans or chickpeas. In other words, whereas loosing one's maize seed can be embarrassing, especially if it happens several times, loosing one's bean seed does not seem to matter. Similarly, some farmers attach a special affectional value to their maize seed (Badstue et al. 2003a, b), which does not seem to apply to other crops.

Genotype-by-environment interaction

Farmers have a clear notion of genotype x environment interaction in maize, as mentioned elsewhere above. The same aspect was mentioned in the case of beans by informants from Huitzo, where differences in altitude are large, e.g. Camilo: "Around here there are beans from

the valley and there are the beans they plant in the hills. The one from the hills does not grow well in the valley, it is different, it is another climate."

Pablo Lopez also mentioned this: "There are several kinds of beans. The one we buy here in the valley. And then we also have a kind for planting for example in Rio Blanco (high altitude). It doesn't work here, neither does the one from here do well up there." In relation to the same issue, Rodolfo, who works common land at mid altitude, commented that he tests both maize and bean seed on a small piece of land before deciding whether to plant it again.

Cooking test

When acquiring beans for planting, it seems to be common practice to submit the beans to a 'cooking-test' before deciding whether or not to plant it. The preference seems to be towards beans which cook fast and which become soft when cooked and gives a thick dark (black) stock. Several informants, both in Zegache and in Huitzo mentioned the need to test the cooking ability of beans, e.g. Liliana: "You put a little on, to know what it is like, then you see which one is the good one". Liliana explained that this is not necessary with maize. "Only in beans." she says, explaining further about maize: "It depends on the nixtamal. It is not the tortilla's fault, not the maize's fault [if the tortilla is not good]. Sometimes it will swell up, sometimes the heat is too low, that is why the tortilla is not good. Yes. If it is cooked properly, any maize is good, yes." Liliana then modifies her comment, mentioning the kind of maize sold by the traveling maize vendors. This kind of maize apparently is difficult to cook and has a tendency to become very sticky when milled, "It sticks in the mill, can hardly be gathered, that's how much it sticks."

Discussion

In the following, an overview of the transaction costs related to small-scale farmers maize seed acquisitions is pulled together, based on the findings presented in the previous sections. This is followed by an overview of the risk factors, which farmers perceive in relation to maize seed acquisitions. Farmers' strategies for risk reduction in relation to maize seed acquisitions are then discussed, and finally an overview of the cost factors related to the acquisition of different categories of seed is presented.

Transaction costs

The findings presented in the previous sections show that the easiest source of knowledge and trustworthy information about seed, not surprisingly, is the people whom the farmer already knows and trusts. Often he or she may already know the characteristics of varieties used by kin or close friends and can easily obtain more information. Indeed, the most frequent ways of obtaining information about maize seed from outside the household are:

- Farmer experimentation,
- Conversations with family members, compadres**,** and neighbors;

- Paying attention to what other farmers are growing and how it performs (e.g. when working together in a tequio[11] or a guelaguetza[12]; and moving around in the communities).
- Furthermore, farmers usually inspect the seed before acquisition as a minimum measure of protection against low seed quality.

In general these ways of acquiring information about maize seed are not interpreted by farmers as sacrifices. Rather, to a great extent, they form part of every day social practice and conversation and are normally not separated from ordinary social life. Still, if the information or the seed is sought further away, e.g. in Oaxaca, it may entail a cost. However, when farmers go to the market or travel to the city, they always take advantage of the occasion to combine several tasks, thereby economizing on transaction costs.

When looking for seed farmers will refer each other to seed providers they know and trust. Referral by others may imply costs in terms of increased search time and the social relations with the new person might be less close. This in turn may lead to increased costs i.e. the one who obtains seed may not get the preferential treatment, which could have occurred with a closer relation. On the other hand the new contact may represent an expansion of one's social network.

Finally, the advertisement of seed for sale via a loudspeaker, as was mentioned by informants in a previous study in this region, represents a cost for the seed provider, but not to the buyer, though of course, the advertisement cost may be factored into the price of the seed.
Farmers' negotiation costs in relation to maize seed acquisition, as reported in this study, are generally low and mostly consist in the time and effort spent to achieve a satisfactory transaction. The type of social relation between the parties involved may influence the outcome of the negotiation, i.e. type of transaction or the price and form of payment. Similarly, depending on the circumstances, the reputation of either of the parties may influence the negotiation, positively or negatively. Furthermore, farmers sometimes try to haggle the price of seed. This way the financial cost of the seed may be reduced, however, depending on the situation, this could be outweighed by increased negotiation costs, in terms of social responsibility or loss of prestige on behalf of the person acquiring the seed.

In terms of enforcement costs the situation is similar. The possibility of compensation, e.g. in case of low germination, is generally very low. The vast majority of seed transactions in the study area are informal and in most cases the farmer has little or no means of actual enforcement. As a result it is essentially presumed that the seed receiver assumes the risk. Nevertheless, a few examples were found of compensation for seed that did not germinate. In these cases, however, the compensation only covered the seed itself, not the investment in land preparation and loss of harvest i.e. only a very partial compensation. Still, if a transaction is not completed satisfactorily, there may be other repercussions, e.g. the seed seeker may avoid that particular seed provider in

[11] Téquio refers to a form of communal work in which one has to provide a service to the community.
[12] Guelaguetza is a Zapotec institution of mutual aid between households. It can take place in many different situations and between different people and includes agricultural tasks, the roofing of houses, weddings, funerals, and fiestas of village saints (Montes Vasquez 1985). Under guelaguetza, gifts must be repaid in kind and in exactly the same amount (Beals 1970; Montes Vasquez 1985).

future and not recommend him/ her to others, or; if the fault is on the seed receiver's side, the seed provider may be very reluctant to engage in new seed transactions with this person.

Transactions are normally considered to be finalized, when payment is completed. However, regardless of the type of transaction, farmers often look at seed transaction from a perspective of mutual favors and consideration. In this light, most informants, if not all, agree that one ought to return the favor, if the need arises and one has the opportunity to do so. This can be interpreted in the sense, that although the transaction has been finalized, a relationship of mutual help and reciprocity continues / has been initiated. In this context certain obligations may adhere, although they are not clearly spelt out. This, on the other hand, permits for flexibility and practical solutions whenever problems arise and social networks of mutual help are called upon.

Risk as a transaction cost

Many farmers have experienced crop failure, either as partial or complete harvest losses for different reasons. When acquiring seed from outside the farm, the risk of crop failure due to inadequate seed is therefore interpreted as a "real" risk and constitutes a principal concern for farmers. To a large extent, the risk of crop failure due to inadequate seed is directly linked to the lack of transparency of seed. On one hand, there is the issue of seed quality, i.e. whether the seed will germinate. On the other hand, if it germinates there is still the question of how the genotype will perform under the particular agro-ecological and management conditions, and whether it will display the traits and characteristics demanded by the farmer.

The question of seed quality mainly implies a transaction cost in terms of risk of germination failure. However, as long as the seed is acquired from another farmer within the same community, the issue of seed quality does not seem to invoke any notion of transaction costs among the informants. In general, as long as the seed was clean and undamaged, farmers in both study communities had difficulty imagining that locally acquired seed would not germinate, i.e. in this situation the perceived transaction costs in terms of germination failure were very low or nil. This may increase in the cases where grain is used as seed, as grain is often stored with less care than seed and though the selection is careful, deficiencies in storage may have lowered seed quality.

Meanwhile, informants manifested a general distrust in market vendors and maize seed from these or other unknown sources. In that sense, the moment farmers acquire seed from unknown sources, e.g. from outside the community, transaction costs increase drastically in terms of perceived insecurity regarding seed quality and/or seed traits, i.e. risk of crop failure due to inadequate seed.

The non-transparency of seed creates problems of incomplete and/or asymmetric information. The seed provider may know that the seed performs well under the usual conditions where he or she has planted it. However, these conditions may be different from the conditions in the seed receiver's field, and the information may therefore not be applicable. Likewise, the seed receiver normally knows the place where the seed will be planted, but this knowledge may not be sufficiently comparable to the knowledge of the seed supplier. In both cases, the asymmetry in information may lead to the acquisition of inadequate seed. This it is not necessarily due to ill

will on behalf of the seller; - it may simply be attributed to incomplete information on the local production conditions or incomplete information on the requirements of the seed receiver in terms of seed traits.

The problem of asymmetry of information is less when seed provider and seed receiver are from the same area. In that case the chances are high, that the seed receiver will know the circumstances the seed was produced under, and likewise, that the seed provider will know the kind of production conditions the seed receiver requires the seed for. However, when distances increase, it may accentuate the problem of asymmetry of information, as chances are that each one will know less about the conditions in which the other grows his/her maize.

Other types of risk may also constitute transaction costs in relation to seed transactions; e.g. in the case of exchange or lending the seed provider assumes a transaction cost in terms of the risk of not receiving the expected quality of seed in return. For lending there is furthermore a time factor, which can be interpreted as negative or positive: the lender is without his/her seed for a time, but on the other hand he/she receives fresh seed in return. Finally, there is yet another risk factor for the lender; that of the seed not being returned. Depending on the amount of seed in question, this can be a relatively high cost, and according to informants' testimonies this is the main reason for seed providers' reluctance to use this type of transaction.

Ways of dealing with risk

Experimentation

As pointed out in the findings, informal experimentation provides farmers with first hand information about the characteristics and the performance of particular maize types under specific agro-ecological and management circumstances. Upon evaluating the experiment, the farmer has a relatively good basis for deciding whether the maize type in question is convenient in relation to his or her production objectives. Such experimentation typically implies planting a separate variety at a reduced scale, e.g. 1-2 rows, but according to the farmers who participated in this study, it does not represent a significant cost, e.g. in terms of extra time or labor. The principal cost is the risk that the experiment will not be successful. However, this is manageable due to the small scale of most farmer experiments. Furthermore, at the end of the day the carrying out of small-scale experiments reduce the risk of major failure. Farmer experiments therefore serve both the purpose of information and of risk control.

Strictly speaking, there may be a question of transaction costs in terms of time linked to farmer experimentation, i.e. the time used gathering information is prolonged. However, for most small-scale farmers in the Central Valleys of Oaxaca, the time spent carrying out farmer experiments, is not a significant transaction cost in comparison to the risks implied, if he/she had decided not to do the testing on a small piece of land first. Furthermore, experiments, which are normally established with relatively small amounts of seed, can often be used to multiply seed. If the farmer chooses to continue to plant that particular maize variety, it may therefore not be necessary to acquire seed again.

Trust and other elements of social capital in seed acquisitions

Trust is a key issue in seed transactions (Almekinders, Louwaars and de Bruijn1994, Seboka and Deressa 2000; Tripp 2000). This is directly related to the lack of transparency of seed. The findings indicate that seed acquired from people the farmer knows and trusts, in general is perceived as entailing less risk of crop failure due to inadequate seed, than seed acquired from unknown sources, i.e. the more the seed receiver knows and trusts the seed provider, the less the perceived risk related to incomplete or asymmetric information. Acquiring seed from social relations of trust can therefore be seen as a way of reducing the problem of lack of transparency in seed, which in turn reduces transaction costs in terms of perceived risk of crop failure due to inadequate seed.

Relations of trust are conducive to easy access and exchange of information at low costs. Acquiring seed through relations of trust may also enhance one's possibilities of preferential treatment, for example in terms of type of transaction, e.g. lending or exchange, which are almost only carried out between people with prior social relations of trust, in stead of purchase (Badstue et al. 2003a). However, in the case of asymmetrical relations, preferential treatment may occasionally come at a social cost in terms of the confirmation or reinforcement of the difference in status of the parties involved, i.e. one dependent on the other.

The issue of trust may be influenced by either of the contracting parties' reputation**.** For example, acquiring seed to try out something new / experiment is accepted as a normal farming activity, as is the occasional complementation of seed. However acquiring seed every year, for lack of observing the traditional custom of selecting and saving ones own seed or for lack of ability to save seed, easily earns one a reputation of being a lazy/bad farmer. This, in turn, is likely to influence the general perception of one's trustworthiness as well as the possibilities for preferential treatment. Nobody wants to lend or exchange seed with someone who is not likely to get a good crop, or who cannot be trusted to fulfill his part of the deal. If the seed seeker is rumored to be unreliable or not a good farmer, any transaction is therefore likely to be a purchase, unless the seed provider feels a special obligation (e.g. is close kin or compadre). On the other hand, the seed supplier may achieve negative reputation, if the seed he /she provided to someone turns out to be of bad quality, or if the seed receiver feels wronged in any other way. This can be a problem for a commercial seed trader, but also for a farmer acting as seed provider. Interestingly the "good farmer" appears in general to be trusted much more than the seed trader, who could be argued to have a professional reputation to protect. This lack of trust in commercial seed merchants appears to be a major barrier for introduction of new varieties to a community.

It is interesting to look at the issue of trust from a perspective of social capital. In their work on social capital Marcel Fafchamps and Bart Minten (2002) distinguish between two meanings of this term; 1) social capital as "a 'stock' of trust and an emotional attachment to a group or society at large that facilitate the provision of public goods"; and 2) social capital as "an individual asset that benefits a single individual or firm". Fafchamps (2002) identifies the difference between the two meanings of social capital to lie in the origin of trust, which may arise from repeated interpersonal interaction - personalized trust; or from "general knowledge about the population of agents, the incentives they face and the upbringing they have received", - generalized trust. As Fafchamps explains (2002), although it has been argued that trust and interpersonal relationships are conceptually and empirically different (Knack and Keefer 1997 in Fafchamps and Minten 2002), the two meanings of social capital can be seen as closely interlinked. For example, agents

may form relationships with other agents to economize on transaction costs – the second meaning of social capital or personalized trust. However, this may lead to a situation in which agents expect others to behave in a trustworthy manner – the first meaning of social capital or generalized trust (Fafchamps 2002, Fafchamps and Minten 2002).

We can apply Fafchamps ideas of social capital to the seed transactions in the Central Valleys of Oaxaca. When farmers in the study communities acquire maize seed from other farmers, they generally choose the seed provider among the people they trust. As is clear in several of the testimonies cited above, they do not believe that seed acquired in this way, would not be good. This can be interpreted as an expression of generalized trust or social capital as a 'stock' of trust in a group. However, many of the farmers will furthermore possess social capital in the form of 'an individual asset' or personalized trust established through repeated interpersonal interactions with their peers. Therefore, in as far as concerns seed transactions within the local community; it could be argued that both types of social capital are at work.

Meanwhile, the perceived risk of crop failure due to inadequate seed appears to be relatively high in seed acquired from commercial seed providers e.g. be it agro-veterinary stockists, market vendors or petty commerce shopkeepers. The remarks and testimonies expressing farmers' distrust of commercial seed providers, makes an example of a situation in which there is neither personalized trust through interpersonal relationships, e.g. previous record of transactions together; nor generalized trust. In fact it is almost the opposite, i.e. a belief that the commercial seed seller will do anything to get at profit, including cheating. In other words, while local seed supply can be understood as facilitated by a high degree of both generalized and personalized trust, commercial seed sellers suffer from a general lack of trust. Furthermore, due to farmers' attachment to local maize varieties and the common practice of selecting and saving seed from one's own harvest, seed acquisition from other sources, e.g. commercial seed sellers, is relatively infrequent. This makes it difficult for individual commercial seed merchants to build up trust through repeated interpersonal interaction.

Others have taken a different perspective on social capital. For example, Portes sees social capital as the capacity of individuals to use networks in order to mobilize resources. 'The resources themselves are not social capital, the concept refers instead to the individual's [and group's] ability to mobilize them on demand' (Portes 1995 in Long 2001). In other words; for Portes, social capital is not something that 'is just there', rather, it refers to the process of mobilizing resources and must be activated in order to acquire particular significance. However, in this particular case where the focus is on transaction costs, it is difficult to distinguish, - and makes little difference, whether social capital is permanently present or if it is only brought into play in the transaction. With either view (Fafchamps' or Portes') the conclusion is that social capital significantly reduces the risks involved in seed transactions.

In the examples used above, transaction costs consist mainly in an element of risk. However, there seems to be a clear relation between the level of trust in the relation between the two parties and risks perceived by the seed receiver, i.e. the level of transaction costs. If the seed provider is from outside the community and a stranger to the seed receiver, i.e. neither generalized nor personalized trust, the transaction costs in terms of perceived risk are high. On the other hand, if the seed provider is a farmer from the same community as the seed receiver and maybe

furthermore a close social relation of his/hers, the level of trust may be high and the transaction costs low. The relation between the two can also be expressed graphically (Fig. 1)

Figure 1 here.

There seems to be a similar relation between transaction costs in terms of risk on one hand and local seed versus introduced seed, on the other hand, i.e. seed that was not acquired from another farmer in the same community.

To a large degree these perspectives coincide with Plattner's conclusion (1989) that the poorer the information, the higher the transaction costs, the riskier the exchange and the more valuable to invest in personalized relationships, which in this case would mean acquiring seed from people one knows and trusts.

Plattner (1989) distinguishes between impersonal and personal modes of exchange. Impersonal being when transactors have no relation with each other beyond the short term of the exchange; and personal referring to transactions between people who have a relationship that endures past the exchange. We could also look at the latter as transactions embedded in people's networks of social relations (Granovetter 1985).

Previous research in the Central Valleys of Oaxaca has found maize seed acquisitions to occur on average 0.31 times per farmer per year, or approximately once every three years (Badstue et al. 2003b). Given this low frequency of seed transactions it would be difficult to establish trust solely based on seed transactions. When transactions are carried out in a personal mode of exchange the seed recipient hedges the risk of receiving poor seed against the whole social relation with the seed provider, thus the problem of establishing trust solely based on seed transactions is overcome. In principle, this would also mean less asymmetry between provider and receiver than in an ordinary market exchange, i.e. relatively low transactions costs when acquiring seed within one's own community. The question is, whether this would apply equally to all farmers in the community?

Hardly any of the persons interviewed are completely without any social relations. Still, this does not mean they are all equally well "connected" or can draw on equal resources in this respect as discussed early in the findings section. Nevertheless, for the farmers who are marginalized in one or several ways and are less well connected than others in their community, it is often, albeit not in all cases, even more difficult, troublesome and costly to engage in non-local transactions. If one's Spanish is very poor, if one is illiterate and have difficulty managing numbers, and if on top of that one has to travel far for non-local seed transactions, local seed transactions still have many comparative advantages, although it may be more difficult for some than for other people in the same community.

Comparing 3 different categories of seed

The table below presents a summary of the main factors influencing seed receivers perceived transaction costs in relation to seed acquisition. A distinction is made between locally acquired seed i.e. seed from the same community or otherwise nearby and introduced seed from further away. As seed produced by the farmers themselves is the most common source of seed, own seed has also been included in the table, though; it obviously involves no transaction cost.

Table 3 here.

Clearly the transaction costs associated with acquiring seed are negligible for farmers as long as the seed transaction happens within the farmer's social network and community. Not surprisingly, other studies in this area showed that most seed transaction occur within social networks and communities (Badstue 2003b). Transaction costs may be substantially higher however, for a farmer who wants to acquire seed outside his/her social network and community. The CIMMYT/INIFAP project which sold seed from a group of landraces representing the diversity of the region was very successful (Bellon et al. 2003a; Smale et al. 2003). More than 200 farmers purchased seed at the local price for seed, mainly to carry out experiments. The project created an information-rich environment in which farmers could see the materials in the field and could purchase seed immediately if desired. These results suggested that farmers are very interested in trying new seeds, but that accessing seed from the "outside" is constrained not so much by the price itself, but by the transaction costs of accessing information and the actual seed from "foreign" varieties.

The importance of trust and other elements of social capital in seed transactions have also been shown to be relevant in another study carried out by CIMMYT with both subsistence and commercial farmers in the coast of Oaxaca and the Frailesca region of Chiapas (Bellon et al. 2003b). In that study, farmers were found to gather information about seed in very similar ways as described here, and like the farmers in the Central Valleys, they had great confidence in their own seed or that of their family, neighbors and friends, but were distrustful of seed from "outside."

Conclusion

This study was based on the hypothesis that issues such as the cost of obtaining information, negotiation costs, and enforcement costs would make up a substantial part of the transaction costs in small-scale farmers' acquisition of maize seed. Nevertheless, the findings suggest that these costs are negligible in most seed transactions, as long as these take place within the village and farmers' social networks. In this case, no evidence was found of specific investments related to obtaining information, and the negotiation costs are generally small, though, they may increase in the case where the receiver of seed is trying to obtain preferential treatment such as lower price than normal. This could then be argued to outweigh the increased negotiation cost. Enforcement costs are not considered relevant; as, essentially, it is presumed that the seed receiver assumes the risk. Farmers therefore generally do not expect compensation for crop failure, even though a few

examples were found of compensation for seed that did not germinate. However, in these cases the compensation only covered the seed itself, not the investment in land preparation and loss of harvest, i.e. only a very partial compensation. In general, the information costs, negotiation costs, and enforcement costs in the current seed transactions appear to be negligible or not relevant, and it would be very difficult to quantify these.

The risk of crop failure due to inadequate seed appears to be the main costs concern in relation to seed transactions. The problem can arise from two sources; either the seed is of poor quality and fails to germinate, or, the germplasm is not adequate for the local environment and fails to yield adequately. Therefore, specifically related to the seed acquisition as such, the question is not whether or not the harvest will fail due to weather conditions, pest attacks or other. Rather, when acquiring seed the farmer's question is: 'Will this seed produce plants, which will perform successfully under the specific condition in my field, and will they produce maize that live up to the standards we expect in my household?' From this perspective, it may be beneficial to treat the issue here referred to as risk of crop failure due to inadequate seed quality or genotype x environment interaction, as a question of quality of information (see p. 3). In any case, a quantification of transaction costs should include the perceived risk of crop failure due to inadequate seed with regards to seed quality and genotype-by-environment interaction problems.

Trust and other elements of social capital play a key role in this system and serve to reduce transaction costs to a minimum. Trust, social and moral obligations create an environment that is conducive to relatively easy seed transactions. Furthermore, since farmers only acquire seed in the margin, the system works well. Farmers from the same community are considered very trustworthy, and it is considered almost impossible that they would supply poor quality seed or provide inadequate information in relation to the seed. Transaction costs are high however, if a farmer wants to acquiring seed outside his or her social network and community; particularly in terms of search costs and risk of crop failure due to inadequate seed.

Seed providers, who are motivated by profit such as commercial sellers, however, are generally not regarded as trustworthy. They are considered willing to sell anything without much scruple. A key problem in the system described here is that seed transactions involve small quantities of seed and are relatively infrequent, hence it is unlikely that a commercial seed system can be supported and furthermore that individual commercial seed merchants build the trust required to be successful, through repeated interpersonal interactions. The costs of selling seed for a commercial merchant may be very high, since farmers purchase small quantities of seed infrequently, but require diversity and a high amount of information, and seem only to be willing to pay no more than two times the price of maize grain for maize seed. It is important hence to quantify not only the transaction costs faced by the purchasers of seed, but also by sellers that are motivated by profit and not just by social or moral obligations, and who can bring interesting new varieties from the outside.

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Table 1

Table 1. Germination rates for seed samples collected from farmers in selected regions of Mexico

Region / Germination data	Coast of Oaxaca	Frailesca, Chiapas	Central Valleys, Oaxaca
Number of samples	51	53	152
Germination rate (%)			
average	60.0	59.5	76.8
standard deviation	3.7	6.7	3.9
maximum	68	68	83.4
minimum	49	35	64.2

Source: CIMMYT, unpublished data

Table 2

Table 2: Producer and consumer prices for maize seed and grain, San Pablo Huitzo, San Lorenzo Albarradas, and Santa Ana Zegache, Central Valleys of Oaxaca, Mexico, May 1998.

Maize	San Pablo Huitzo	San Lorenzo Albarradas	Santa Ana Zegache
Seed (MX$/kg)			
Buy	4.66	--	4.09
Sell	4.34	4.97	4.07
Grain (MX$/kg)			
Buy	2.20	1.54	2.61
Sell	2.17	2.06	2.60

US$1 = MX$8.89 (May 1998).
Source: Smale et al. 1999.

Table 3

Table 3: Seed receiver's perceived transaction costs in relation to seed acquisition – a comparison of 3 different categories of seed

Cost factors	Own seed	Locally acquired seed	Introduced seed
Information costs	None	Low or none	Potentially higher, but no investment being made
Negotiation costs	N.A.	Variable	Low
Enforcement costs (incl. possibility for compensation in case of failure)	N.A.	Not considered relevant – risk borne by receiver	Very low – risk borne by receiver
Perceived risk of germination failure	Low	Low	Higher
Perceived G x E risk	None	Low	Higher
Transaction types	N.A.	Various	Purchase
Price of seed	Nil*	Low	Higher
Type of seed provider	One self	Farmer from same community	Typically commercial seed seller
Motivation of seed provider	N.A.	Social responsibility**	Profit
Trust and other types of social capital	High	High	Low (unless personalized trust)

* From the point of view economical theory, there is a shadow value to using own seed, even though there is no market transaction. However, as pointed out by several authors (e.g.: Buckley and Chapman1997, Sadoulet and de Janvry in Gabre-Madhin 2001) transaction costs cannot be understood separate from issues of perception, and from the perspective of the small-scale farmers, who participated in this study, using own seed does not represent a cost and it is not bought – rather, it has the advantage of being free.

** In a survey carried out as part of another CIMMYT research project in these and other communities in the Central Valleys of Oaxaca, the seed providers motive for distributing seed was related to aspects of social responsibility in 69,7% of 195 seed distributions, while in 25,6% of the distributions registered, the seed provider said to have distributed the seed in order to obtain something (money, goods or service) in return (Badstue et al. 2003 b).

Figure 1

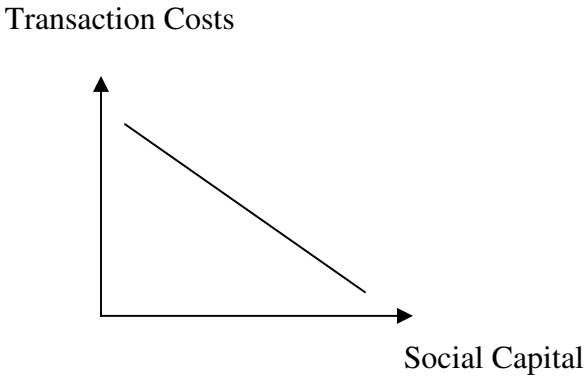

Figure 1: Social capital and transaction costs in seed transactions.

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