SUSTAINING SMALLHOLDER FARMERS' LIVELIHOODS THROUGH RAINFALL-DEFICIT-INDEX-BASED CROP INSURANCE IN DROUGHT-PRONE AREAS: LESSONS FROM ETHIOPIA

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Abstract: The main objective of this article is to assess the contributions in sustaining the livelihoods of smallholder farmers of rainfall-deficit-index-based crop insurance pilot project based on haricot beans implemented in Ethiopia in 2009. Based on cross-sectional data, assessment results revealed that crop insurance has a potential in sustaining the livelihoods of smallholder farmers, but that there was a problem of information flow, belated payout and inadequate consideration of farmers' preferences. Scaling-up crop insurance scheme in the future increasingly depends upon building farmers' knowledge on how the scheme works, through proper agricultural extension services and farmers' active participation. Signifying crop insurance as an appropriate risk management strategy, the article underlines the importance of public extension services besides appreciating farmers' motivations to take over the management and leadership of their own affairs when existing structures are not responsive in the context of practicing crop insurance.

Keywords: Crop insurance, rainfall deficiency, payout, smallholder farmers, pilot project.

1. INTRODUCTION

Farming is a financially risky business. On a daily basis, farmers in general and smallholder farmers in particular are confronted with an ever-changing landscape of possible price, yield, and other outcomes that affect their financial returns and overall welfare. The consequences of decisions or events are often not known with certainty until long after those decisions or events occur; and so, outcomes may be better or worse than expected. When aggregate crop output or export demand changes sharply, for example, farm prices fluctuate substantially and farmers may realise returns that differ greatly from their expectations. Thus, understanding risk is a key issue in helping farmers to make better decisions in risky situations and in providing useful information to policymakers in assessing the effectiveness of different types of risk protection tools (Harwood *et al.* 1999).

Weather-related risks, when not managed, adversely affect the economy and perpetuate poverty throughout the developing countries (Wenner 2005) because they cannot be easily predicted and are harder to mitigate. On the other hand, microfinance institutions do not provide credit

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to those people who are vulnerable to weather risks due to the fear that the loan will not be paid back (Miranda and Vedenov 2001; Barnett, Barrett and Skees 2008). These remain to be some of the driving forces of livelihood challenges for poor smallholder farmers in developing countries.

Poor smallholder farmers often exercise risk coping/transferring strategies (ex post responses) which include crop sharing, informal risk pooling, seeking non-farm income, sale of productive assets, reallocation of labour, and public relief (Walker and Jodha 2006; World Bank 2005). These are, however, inadequate for recovery and building resilient livelihoods (Walker and Jodha 2006). Thus, publicly provided or market-based formal mechanisms which transfer risks to other individuals or institutions or crops or regions are used (Cummins and Mahul 2008; Hazell, Pomareda and Valde 1986; Sakurai and Reardon 1997).

One of the different types of insurance policies developed to help farmers confronted with the adverse effects of crop production risk is agricultural or crop insurance (CI) which Wenner (2005, 16) explains as:

> … a financial contingency contract that transfers production risk from a producer to another party via the payment of a premium that reflects the true long-term cost of the insurer who is assuming the risks. The insurer pools the risks faced by a large number of individuals and covers losses incurred by any one individual in the pool. It serves to essentially protect assets, stabilize income, and smooth consumption.

A typical means of transferring risk in farming is through agricultural insurance or CI projects, which is 'a financial tool to transfer production risk associated with farming to a third party risk off taker via payment of a premium that reflects at least the true long-term cost of the insurer assuming those risks' (World Bank 2006, 13). This is found to be an effective tool to manage risks, alleviate poverty, and foster economic development (Skees *et al.* 2006; GlobalAgRisk 2009; Warner *et al.* 2009; Hess, Wiseman and Robertson 2006). Unlike the traditional insurance mechanism in which the indemnities are paid based on the actual individual yield losses, this method uses an index (rainfall, temperature, wind speed, humidity, etc.) that often strongly correlates with the loss to pay indemnities (Barnett and Mahul 2007). Given the availability of objectively measured and easily implemented data, weather-index-based insurance (WIBI) system related to rainfall is commonly used (GlobalAgRisk 2009; Hellmuth *et al.* 2009) across farm enterprises and countries.

In WIBI, the usual practices remain to be the construction of an index level that serves as a proxy for the threshold level of crop yield losses on the basis of a critical analysis of historical rainfall data, which help determine the range of indemnity and make payout when the realised value of the index exceeds the threshold. In such situation, insurance protects framers from excess rainfall. Similarly, payout is made when the index value falls short of the threshold level whereby insurance protects farmers

from the effects of drought. In fact, the amount of payout varies based on the sum of liability purchased (GlobalAgRisk 2009). Apparently, the more the liability farmers are able to proactively purchase, the more payout they would obtain and hence reduce the likely negative impact of weather risk on their livelihoods through index insurance. If the risk that occurred results in yield loss, the indemnifications help them avoid the inefficient and informal risk coping mechanisms such as sale of productive assets which could erode framers' livelihood portfolios.

1.1. The Ethiopian Experience in Crop Insurance Projects

As recorded history testifies, most parts of the Ethiopian agro-ecology are not favourable for smallholder farmers' (SFs) (referred to also as farmers, which literary means farm households) production and livelihood sustainability. The record further reveals that drought and famine have been the features of these farmers for a long period of time. The country has experienced at least five major national droughts since 1980. Cycles of drought create poverty traps and perpetuate famine for large size of households. According to the World Bank (2007), between 1999 and 2004, more than 50% of the households in Ethiopia survived at least one major drought shock whose impacts was found to have long-term welfare consequences. For instance, households who experienced drought were found to have 16% lower consumption than those households who were not affected, and those who had suffered most in the 1984–85 famine were experiencing lower growth rates in consumption compared to those who had not faced serious problems in the famine (Vargan 2010), a tragic situation still continuing.

Options that could capacitate farmers to counteract the problems of drought and famine and their malaises have often been identified and practiced. These options range from direct food aid and safety net programs and improvements of agricultural production techniques to the provision of credit facilities and CI schemes/projects. However, each of these options has been surrounded by some limitations. In this regard, persistent risks of drought against which smallholder farmers are unable to insure, due to missing insurance markets, have been well recognised in Ethiopia. Actually, missing insurance markets is a common feature of the developing countries including Ethiopia, a feature explained by low incomes, information asymmetry, moral hazard and nature of agricultural risks (Devereux and Guenthe 2009). Moreover, Ethiopia's experience in non-life insurance market is less developed than the average of sub-Saharan African countries due to domestic insurers' low technical and financial capacity to underwrite catastrophic risk (DRFIP and GFDRR 2012; Devereux and Guenthe 2009). Likewise, the country's experience with CI project dates back only to a few years despite the rampant effects of rainfall variability and frequently occurring drought on crop yields and consequent impact on rural livelihoods (World Bank 2005), a condition that further perpetuates vulnerability to food insecurity, premature mortality, and recurrent famines.

The first notable experience of CI in Ethiopia began with the support of the World Food Programme (WFP) in 2006 as emergency response (Alderman and Haque 2007) whereby payout was made to vulnerable households (Hartell and Skees 2009). Following this successful experience, attempts made by the Ethiopian Insurance Corporation could not succeed (Skees *et al.* 2007) while the experience of the Ethiopian Nyala Insurance Share Company (NISCO) indicates some progress (Eyob 2009). The main objective of this article was to assess the potential contributions of the rainfall-deficit–index-based CI in sustaining the livelihoods of SFsin drought-prone areas on the basis of the pilot project implemented in Ethiopia in 2009. It also briefly addressed the implementation record of the CI pilot project.

1.2. Conceptual Framework

This article is informed by the conceptual underpinnings of risk chain analysis framework outlined by Heitzmann, Canagarajah and Siegel (2002) to enable the analysis of climate risks— drought, its impact — crop failure and emerging risk management — crop insurance amongst smallholder farmer households. This follows the notion that individuals or households are vulnerable to risks (Holzmann and Jørgensen 2000) and vulnerability has been defined as the forward-looking state of expected outcomes, which are determined by various internal and external forces that can be measured by relevant risk management instruments (Heitzmann, Canagarajah and Siegel 2002). Climate risks proved to have a potential effect on the livelihoods of households. This article rests on the contributions of risk management strategy— crop insurance— in helping vulnerable households sustain their livelihoods. At the same time, the research explores challenges experienced in implementing the crop insurance scheme per se.

It was within the above experiential and conceptual settings that this article was framed in assessing a pilot crop insurance project as an option in sustaining smallholder farmers' livelihoods in Boset District (Woreda), Oromia Region, Ethiopia. The research upon which this article is based was carried out between February and May 2010.

The remainder of this article has three sections. The second section presents the methodology while the third and fourth sections address the results and discussions, and conclusions and implications, respectively.

2. METHODOLOGY

2.1. The Pilot Crop Insurance Project and Context of the Study

The rainfall-deficit-index-based (RDIB) pilot CI project was implemented in Boset District, located in Central Oromia, Ethiopia (Fig. 1). Boset and its environs have always been drought-prone and SFs suffer from continuous crop failure. Considering this problem, WFP and NISCO signed a Memorandum of Understanding (MoU) to design and implement this pilot

project in 2009, which, if proved successful, would be scaled-up and expanded to other areas in the country. As indicated in the MoU, such actions would help reduce the vulnerability of SFs to rainfall deficiency (RD) and sustain their livelihoods.

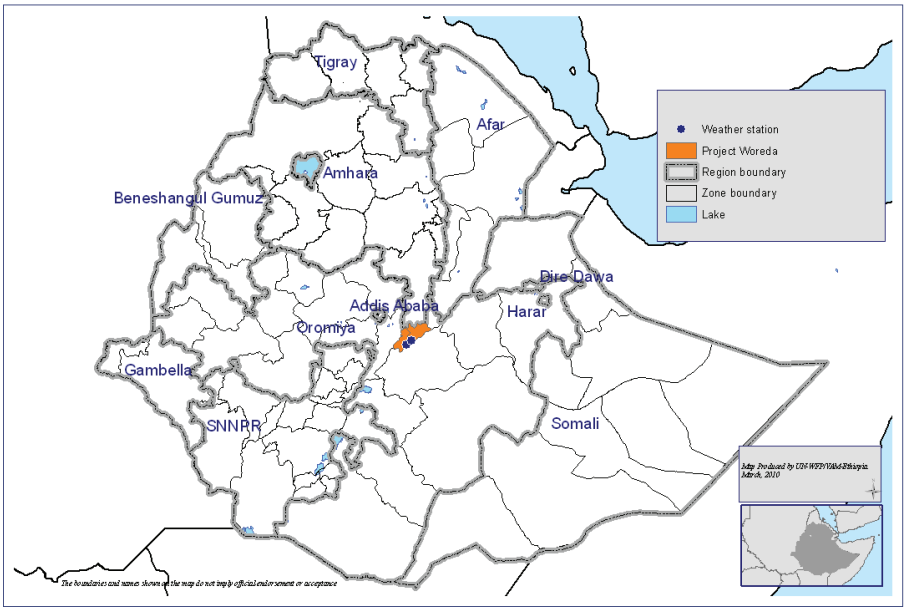

Fig. 1. Map Showing the Location of Pilot Crop Insurance Project Area

Although all crops are affected by RD, haricot beans was selected to be insured based on the agreement made among farmers, Lume-Adama Farmers' Cooperative Union (LAFCU) and NISCO. Accordingly, 137 SFs (farm households) who cultivate haricot beans were insured. LAFCU covers large area of land and thousands of farmers along with the insured framers.

A good number of stakeholders were involved in the pilot project with varying capacities, but all playing supplementary roles. WFP provided technical support in the preparation and design of the insurance contract document; Oromia Bureau of Agriculture and Rural Development (OBARD) rendered administrative services; National Meteorological Agency (NMA) supplied historical rainfall data; NISCO insured farmers supported by Swiss Reinsurer Company; and LAFCU paid member premiums and later settled payouts along with leading project implementation on behalf of member farm households. What emerged quite obviously as a missing element in this stakeholder partnerships is the extension services unit of OBARD, which often plays significant roles in catering information to framers about new ideas to increase their knowledge that would help them make decisions on whether, how and

when to adopt this new idea of CI. As shown below, this missing element in fact determined the fate and outcome of the pilot project in various ways.

The pilot project was meant to cover drought events affecting the production of haricot beans during its growing Meher season (01 July 2009 – 30 September 2009) of the Ethiopian agricultural calendar. Respective documents indicate a payout of 50–60% of the total sum insured since there was a partial failure of rain during Meher.

The pilot project contract coverage targeted three cultivation phases: initial phase, mid- phase, and final phase. At the end of each phase, RD index was computed as the sum of the deficits observed during the dekads (10 days) included in the same phase with respect to the corresponding dekadal (10 days interval) expected rainfall levels (Table 1) according to the following algorithm (IFAD/WFP 2009):

1. If rainfall accumulated during a *dekad* exceeds or equals the water requirement of haricot beans production during that particular period, there is no rainfall deficit.
2. If rainfall accumulated during a *dekad* is less than the water requirement, there is rainfall deficit.

Table 1. Expected rainfall levels

Dekad	Dates	Expected rainfall level (mm)
1	July 01 – July 10	20
2	July 11 – July 20	20
3	July 21 – July 31	30
4	Aug. 01- Aug. 10	42
5	Aug. 11 – Aug. 20	45
6	Aug. 21 – Aug. 31	30
7	Sept. 01 – Sept.10	30
8	Sept. 11 – Sept. 20	25
9	Sept. 21 – Sept. 30	10

SOURCE: IFAD/WFP (2009, 8).

At the end of each phase, Rainfall Deficit Index (RDI) is computed as the sum of the deficits observed during the dekads included in the same phase. The payout structure of the contract is based on the typical capped option contract typology characterised by a trigger level, an exit level, and the corresponding maximum payout, and a tick or tick size defined as follows (IFAD/WFP 2009):

1. *Rainfall Deficit Index*: A quantity derived by suitable calculations performed on the rainfall data recorded at the selected, often the nearest, weather station.

2. *Trigger:* Threshold above or below which payouts are due. In the case of Boset District, payments were due when the calculated value of the index is above the trigger.
3. *Exit:* Threshold above or below which no additional incremental payout is applied. The maximum payout is paid if the calculated value of the index is above the exit threshold.
4. *Tick:* Incremental payout value per unit of deviation from the trigger. For example, if the maximum payout (the insured sum) is Birr 2000, given a trigger at 10 mm and an exit at 30 mm, the monetary value of each mm of the index above the trigger is: Birr 2000/ (30 mm – 10 mm) = Birr 100.

Then, payout P at the end of each phase was determined by the following formula:

$$P = \max\left[0, \min\left(Tick \cdot \left(Rainfall\,Deficit\,Index - Trigger\right), Max\,Payo\right.\right.$$

The payout relates to RDI and increases when rainfall decreases. Therefore, the trigger for payout is set just at an appropriately low value above which a payout must be settled. The payout decreases linearly for each mm of rainfall deficit below the trigger. Likewise, the maximum payout is made below the exit level (IFAD/WFP 2009).

The rainfall data employed to compute RDI were collected from the reference weather station, located at a distance of about 10 kilometres at Bofa (capital town of Boset district) and certified by NMA. Sodere Weather Station, which is the nearest, was taken as the fallback station in case the reference weather station fails for any reason to provide data.

As part of the requirement for the insurance contract, there was a plan to issue certificate to all 137 beneficiary farm households included in the pilot project insurance contract. The planned contract certificate included: the Expected Rainfall Level, project and rules for the computation of rainfall deficit index, rules for the rainfall deficit computation panel, term sheet for rainfall deficit index CI, and computed rainfall deficit panel (IFAD/WFP 2009, 6–10).

Following the above procedures and steps, the payout of the 137 beneficiaries amounting to Birr 309,116.25 was settled out of the sum insured of Birr 639,000.00, the total premium being only Birr 73,490.00[1] (Table 2).

Table 2. The performance of rainfall deficit index based crop insurance, Boset district, Oromia, 2009 (Birr)

Area	Crop type	Size of farmers	Premium rate	Premium	Sum insured	Claim settled	Technical supporter	Data provider
Boset district	Haricot beans	137	11.5%	73,490	639,000	309,116.25	WFP	NMA

SOURCE: IFAD/WFP (2009, 6).

2.2 Methods of Data Collection and Analysis

This assessment employed a mixed methods research approach of data gathering and comparative analytical method since such methods not only easily reveal the benefits of purchasing CI but also generate additional empirical evidences for a clearer understanding of the potential contributions of the pilot project in sustaining farmers' livelihoods in the future. Fifty per cent of the 137 beneficiaries and almost equal size of non-beneficiary SFs among LAFCU members (136 in total) were selected as a sample of the study. The selection of individual sample beneficiary SFs was based on random sampling technique; a lottery containing the words odd and even was drawn and odd was picked and all households preceded by odd registration numbers were selected, while the identification of individual non-beneficiary SFs was based on 'snowball approach'. The latter approach was employed since large number of non-beneficiary SFs was unaware of CI and unable to respond to interview questions as observed during the time of pre-testing the survey questionnaire. An utmost effort was made to avoid bias in identifying the sample non-beneficiary SFs.

Three focus group discussions (FGDs) consisting of 7–9 members were also organised and conducted. The first one included male- and female-headed beneficiary SFs (and hence mixed) because of the limited number of female-headed households (FGD-1). The last two FGDs were organised from non-beneficiary male-headed (FGD-2) and female- headed (FGD-3) SFs.

2.3. Data

Data collection was carried out between February and May 2010. Household survey questionnaire and checklists were prepared and used to collect quantitative and qualitative data, respectively. Data generated relate to the level of understanding, challenges, preferences and perceptions of SFs about CI as an option to improve and sustain livelihoods. Quantitative data was analyzed using SPSS software whereas qualitative information was examined through coding and categorising transcripts into relevant themes to detect key concepts and statements, which were used in complementing the quantitative results supported by available secondary data.

3. RESULTS AND DISCUSSION

The average land size cultivated with haricot beans by the beneficiary SFs was 1.64 hectare (ha) and the corresponding size for the non-beneficiary SFs was 1.65 ha. The average yield for the beneficiary and non-beneficiary SFs were 146.1 kg/ha and 134.1 kg/ha, respectively. The difference could probably be attributed to more attention given to the insured crop by the former than the latter group.[2] On average, 1.07 ha, nearly two-third of land cultivated by the beneficiary group, was covered by the insurance contract of haricot beans.[3]

3.1. Purchasing Crop Insurance

According to the findings, the main reasons that motivated the beneficiary SFs towards purchasing CI were related to the need for money meant to buy improved seeds and fertilisers (25%), advice from cooperative members (14.7%), and risk reduction associated with RD (11.8%), among others. More than a quarter (26.5%) of the beneficiary SFs had no knowledge of purchasing the insurance they actually purchased as a means of risk reduction associated with RD (Fig. 2). For them, it was the usual flow of aid from elsewhere which had to do with the fact that none of the beneficiary SFs was given a copy of the contract agreement document and as a result they were unfamiliar with the clauses of the agreement (FGDs and see also Table 3). Furthermore, access to additional information concerning CI was limited during the introductory stage of the pilot insurance project. As a result, even the beneficiary group of SFs had inadequate knowledge about the intended objectives and legal frameworks of the project.

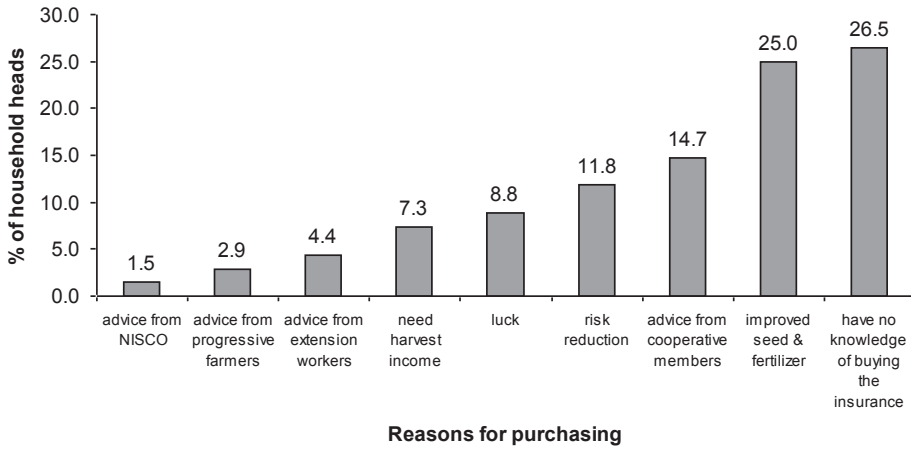

Fig. 2. Reasons for Purchasing Crop Insurance by Farmers
SOURCE: Based on Own Data

As indicated by FGD-2, 'Many fellow farmers had no information about CI. Even those who had some information did not clearly understand the importance of CI.' Besides, the main reasons specified for not purchasing CI by the non-beneficiary SFs were lack of information (86.8%) and lack of clarity (7.4%) on available information (Fig. 3).

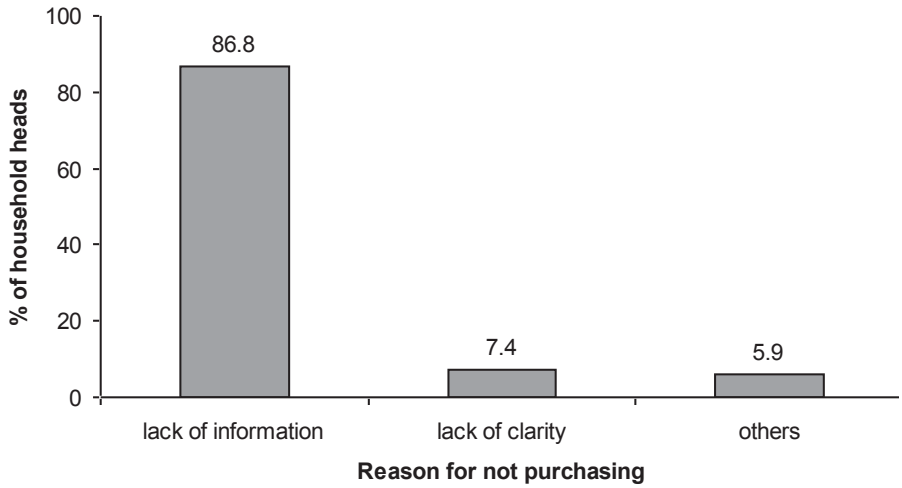

Fig. 3. Reasons for not Purchasing Crop Insurance by Farmers

SOURCE: Based on Own Data

In the same manner, FGD-1 notes that:

> Some of us received little information, and others did not have any idea. Initially, this information was interpreted either in encouraging or discouraging ways, and hence was confusing. Those who were discouraged refrained themselves from purchasing the insurance. Some knowledge of its importance came after receiving payout. Still we do not know how we got the payout.

As can be seen from Fig. 4, about 73.5% and 79.4% of the beneficiary and non-beneficiary SFs, respectively, had no idea about CI and therefore the level of beneficiary SFs' awareness and knowledge about CI was almost analogous with that of their non-beneficiary counterparts. More than a quarter of the beneficiary SFs had no clear understanding of the CI they purchased (while 20.6% were with not much knowledge and 5.9% with some knowledge) which means that there was information asymmetry even among beneficiary SFs.

In all counts, problems of inadequate information and lack of knowledge of both groups of SFs about CI could have been overcome by the contributions of the extension services of the OBARD. It was unfortunately missed in the design of the pilot project itself. Had there been

adequate consideration and involvement of the extension services, more SFs from both groups could have been involved in the project and the outcome would have been entirely different. The availability of information serves as a base of knowledge, stimulus to make informed and rational decisions helpful to take practical actions. New interventions like CI require clear understanding and knowledge of the nature of risks being insured (World Bank 2006).

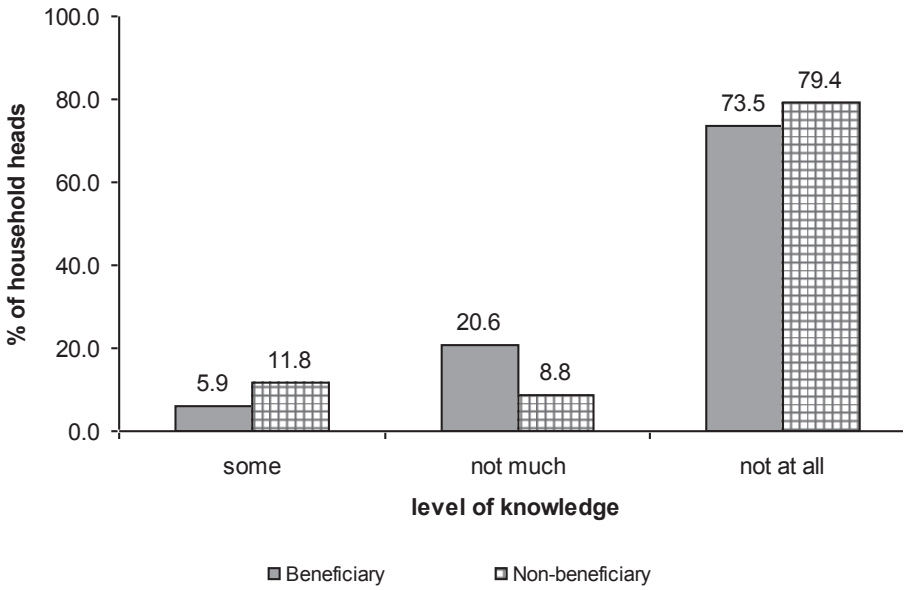

Fig. 4. Farmers' Knowledge about Crop Insurance
SOURCE: Based on Own Data

3.2. Need for New Organisational Arrangement

As a result of problems related to the flow of information and the belated payout (see below), farmers lost trust for LAFCU and tell that they are disappointed. They seem to have observed a kind of self-serving tendencies among the leaders of the LAFCU on the one hand, and their own leaders on the other. This led them to express the need to have a new organisational arrangement that will allow them access information, pay premiums and obtain payout as per the contract agreement. Towards that end, they believe in the formation of committees in all *Kebele* Administrations (KAs) (basic and local administrative units) and the formation of a central committee that represents all KAs. These envisaged committees will take over the leadership from LAFCU during the next period of the insurance project (FGD-2). The problem nevertheless relates to the initial design of the pilot insurance project where the importance of the roles of extension services of

the government was undermined or forgotten. This was noted to be one of the most important learning experiences of the CI pilot project (FGD-1).

3.3. Changing Environment, Declining Crop Yields, Vulnerability of Livelihoods and Crop Insurance

Resulting from the changing environment in general and RD in particular, about 39.7% of the beneficiary SFs lost their entire crops, which means they did not get any harvest. About 35.3% lost close to 80–85% while the remaining quarter lost about three-quarter of the expected yield of various crops (Table 3).

Table 3. Crop damage, average amount of payout and land size covered by insurance for various crop damages by natural hazard

Crop damage (%)	Average amount of payout (Birr)	Average insured size of land (ha)	% of beneficiary farmers
<=75	1961.6	1.01	25.0
(80-85)	2071.1	1.07	35.3
All	2113.9	1.09	39.7
Total	2060.7	1.07	100

SOURCE: Based on Own Data

On average, insured SFs lost more than 80% of their haricot beans (FGD-1). Since payout is calculated on the basis of RD index established for haricot beans production (IFAD/WFP 2009), different kinds of reduction in the yield were not considered in the calculation of the payout. As observed, the minimum size of land covered by the pilot insurance project was 0.5 ha per SF household and for this minimum payout of Birr 967.50 was paid, while the maximum size of land covered was eight ha per SF household for which maximum payout of Birr 15,480.00 was paid.

Moreover, SFs expressed their realisation of changes in the environment propelled mainly by RD, deforestation, soil erosion, drying up of water resources, etc. These changes, as noted by FGDs, directly affect crop and animal production as a whole, which in turn reduce income and food availability. Such deplorable situations make the livelihoods of households more precarious and vulnerable, making external supports like CI very necessary. Therefore, the changing environment, a fearful situation, is a fundamental factor in creating increased interest among SFs in deciding to purchase CI in the future.

3.4. Length of Time to Receive Payout

The pilot project CI contract agreement document spells out that ‘payout shall be settled after the end of each phase and within 30 days after receiving the weather data’ (IFAD/WFP 2009, 11). However, only 17.7% of the beneficiary SFs managed to receive payouts within a month while the large proportion (73.5%) received after a month and half despite the

fact that almost all of them (98.5%) expected the time to receive payout to be as short as possible and not more than one month (Table 4).

Table 4. Length of actual time taken and time expected by beneficiary farmers to receive payout

Actual time	%	Time expected	%
Less than 30 days	7.4	Less than 10 days	21
About a month	10.3	11–20 days	34
Between 31–45 days	8.8	Until 30 days	43
Between 46–60 days	27.9	More than 40 days	2
More than 60 days	45.6		
Total	100		100

SOURCE: Based on Own Data

A comparison of the actual and expected time to obtain payout shows a wide gap mainly resulting from the immediate financial needs of the farmers and the clauses of the contract agreement, which was not attended to. There existed therefore an observed conflict between the insured and the insurer, which could possibly hamper the scaling-up of CI in the future. On the other hand, making payout on time often 'ensures timely relief, since resources can be disbursed immediately after harvest, protecting household food consumption and assets' (Hess and Im 2007, 26). The livelihoods of the SFs can easily be influenced when the payouts come on time since they have to settle bills related to government duties, school fees, fertilisers and other arrears. Delaying payouts leads to the frustrations of SFs, which may eventually force them to make a crucial decision of selling productive assets like oxen and cows that beyond any doubt leads to the erosion of the foundation upon which the livelihoods of SFs depend. Given the dire need for money, asking for *the time value of money* makes more sense to vulnerable SFs than any other business entity.

3.5. Farmers' Expected Preferences and Changes

It appeared that SFs seemed to have made unanimous decision in purchasing CI in the near future. Their strong preference was related to insuring multiple crops. Nonetheless, the beneficiary farmers prefer purchasing insurance on the basis of reduction in crop yield to doing it on the basis of reduction in the amount of rainfall (FGD-1) since they believe that better payout could be obtained on the basis of reduction in yield than on RDIB insurance. Being driven by the exigencies of livelihood situations, SFs have growing needs for any kind of support that they feel could provide relief. It is noted that yield-based crop insurance has proven to be an innovate solution to the problems that inclement weather can pose for many SFs (Africa Growth Initiative 2011). Nevertheless, given the limited capacity, experience and interest of the insurance companies, including NISCO, in Ethiopia, neither it is feasible to insure all kinds of crops grown

by SFs nor it is possible to respond to all their expressed needs at once. Initially, the insurance coverage needs to be limited to selected crops but it can gradually be extended to achieving the desired objective of the farmers (Climate Change Cell 2009). Obviously, NISCO would be trusted more by SFs if their preferences are upheld. This brings forward preference-based CI of the farming community with regard to WIBI, which includes RDIB insurance as one of the changes that have to be made in the future in situations of scaling-up and expanding CI schemes.

Since a number of factors cause serious decline in yield, NISCO most probably prefers insuring SFs on the basis of RD index, as was the case, to insuring them on the basis of yield reduction. The preference of the SFs has to do with 'basis risks' associated with the underestimation of the losses incurred in the calculation of payout or any compensation to any damage for the insured. There was hence a mismatch between the preferences of the insured and the insurer. In any way, SFs' trust in the index insurance product in Boset district will have an effect on the future arrangements of CI unless a compromise is reached between the two, the insurer and the insured, by involving a third party that can take care of the concerns of NISCO given the preference of the farming community. Both sides need to note that trust develops when and where preferences are met.

Notwithstanding the above, the intention of insuring single crop was higher among female-headed than male-headed non-beneficiary SFs (60% and 93.1%, respectively) contrary to the intention of insuring multiple crops (Fig. 5). This shows that male-headed non-beneficiary SFs were better prepared to take risks than their female-headed counterparts, which could partly be explained by the fact that males were endowed with better assets and higher level of awareness than females. Such an observation further brings to light the gender sensitivity of CI at the level of SFs, which will necessitate the consideration of such sensitivity beforehand as one of the crucial factors of the prevailing local socio-cultural situation. This situation would either hamper or facilitate insurance intervention. As noted by Davis, Swanson, and Amudavi (2009), local approaches to development often sideline females and their roles in Ethiopia, particularly when it comes to extension and education services; and this is a situation which needs to be corrected in the case of introducing and scaling-up CI programmes. Likewise, one would expect similar differences between the better-off and the poorer SFs.

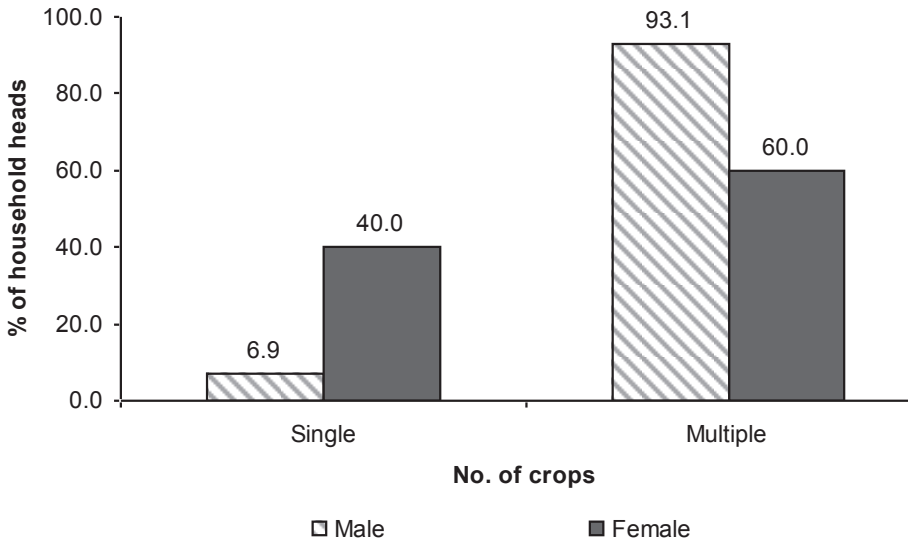

Fig. 5. Number of Crops Non-beneficiary Farmers Prefer to Insure, by Sex of Household Head

SOURCE: Based on Own Data

Regarding changes the beneficiary SFs expected from the Insurer Company, about 92.6% (63) of them, the largest majority, need a clear explanation of the clauses of the contract agreement. This is the result of not handing over a copy of the contract agreement certificate to the insured SFs. Similarly, about 39.7% (27), 36.8% (25) and another 39.7% (27) of the insured SFs demand an increase in payout, paying indemnity promptly and an increase in the level of awareness about CI, respectively, among others. There were in fact multiple responses, accounting for percentage of responses summing up beyond 100.

As noted elsewhere, RD was accorded the highest rank by framers in causing yield reduction for all crops including haricot beans. In this regard, it is noteworthy, since crop production depends on rainfall and remains to be the basic means of survival, RD is considered to be a leading livelihood challenge. Thus, CI schemes remain to be one of the options in the eyes of the farmers in protecting and sustaining livelihoods. Beneficiary SFs have also shown trust on CI as a mechanism of surviving risks associated with rainfall shortage, which could be attributable to the payouts NISCO delivered.

In spite of the above, SFs unanimously look for stakeholders who keenly provide adequate information to increase knowledge and initiate interest to purchase CI since it is this lack of information that was noted to be the main reason by non-beneficiary SFs for not purchasing insurance.

However, there is a belief that information asymmetry could be overcome through proper implementation of WIBI (Devereux and Guenthe 2009). Thus, NISCO is expected to introduce a number of changes among which providing adequate information, explaining the clauses of contract agreement, increasing payout, paying indemnity promptly, and giving primacy to multiple crops as well as yield-based CI instead of RDIB CI are prominent. If introduced, these factors will develop farmers' knowledge as well as good trust towards CI.

On the other hand, preference attached to yield-based CI informs the fact that SFs were less comfortable with RDIB CI which also shows the likelihood that they could pay more premium for yield-based CI that could cover the known high administrative cost often incurred to estimate yield losses. This is a typical rational that emerges from the expected high payout resulting from yield losses engendered by erratic or absence of rain. Such a shift in preference may help SFs to overcome problems associated with the basis risks and generate their effective participation in the future CI schemes. However, instead of yield-based insurance, where insured farmers get the indemnity if the yield is below some specified level, insurance coverage against yield losses caused by specific perils (e.g. drought, storm, flood) are believed to be more effective (Climate Change Cell 2009).

As the findings revealed, SFs have unwavering position in upholding the importance of CI and the decision about insuring haricot beans and other main crops, such as *teff*,[4] maize, and sorghum, in the future. This decision stemmed not only from the perceived business-like benefits generated from insuring crops but also from the nature of the changing environment and its serious impacts on livelihoods. In other words, fear of the evolving environmental hostility is the main reason for the decision of SFs to actively seek for any option to survive such hostility. Understandably, therefore, the more the environment becomes hostile, the more SFs seek external support as a means of transferring risks to or sharing them with any credible source.

The pilot project illustrated that RDIB CI has embedded potential to protect SFs against the dangers of losses in crop harvest caused by RD, guarantee food security, and reduce financial crisis. 'As an innovation, index insurance may hold answers for some of the more obstinate problems faced by the poor and the vulnerable' (Annan 2009, III). Despite some challenges, the contribution of NISCO and other stakeholders in implementing the pilot project was fairly regarded by the beneficiary SFs. After all, the pilot was meant to be a learning experience (IFAD/WFP 2009). A good lesson is that the pilot can be scaled-up provided that the insurer in unison with relevant stakeholders and in particular the extension unit of the OBARD deliver information ahead of time and implement the insurance scheme as per the contractual agreement. The latter needs to be based upon a clear knowledge of the participating SFs, i.e., the clauses of the contract agreement need to be anchored on and reflect their concerns.

The bottom-line is that all actors involved in development ventures are required to continuously seek better ways of supporting SFs to develop their initiatives and innovative capacities.

One of the notable outcomes of the assessment is that given high interests of the SFs to insure crops, there is more likelihood of registering large size of land under haricot beans, which is in fact presently more of a cash crop, at the expense of producing staple crops (*teff*, maize and sorghum). Under such circumstance, multiple crops have to be insured in order to increase the production of staple crops and enable farm households secure own food supply.

A consensus reached among farmers to form their own new committee that will handle all transactions related to the delivery of CI issues in the future is a result not only of the unfavourable organisational structure and inadequate leadership beneficiary farmers had experienced in the pilot project but also of their increasing interest to participate in CI scheme in the future. Hence, each KA expressed interest to form its insurance committee which in turn forms a joint central insurance committee that will replace LAFCU in delivering services related to insurance schemes. It may be that since farmers need transparency and accountability as well as timely execution of insurance-related matters, their quest for effective organisational leadership deserves affirmative response but it requires adequate government involvement and support.

3.6. The Need for Proper Extension Services: Experiences

In India, pilot crop insurance schemes had already emerged as early as 1973–1976 as components of agricultural extension projects. As noted, it is necessary to undertake insurance awareness programmes for the farmers in a big way, which cannot be done by only one agency. In addition to government extension agencies, banks and insurance companies can play an important role. The fundamentals of insurance and its pricing need to be explained to farmers, as can their concerns about high premium and not receiving financial benefits every year. Procedures relating to existing crop insurance schemes should also be explained. Banks may consider opening counselling centres, either individually or with pooled resources, not only for insurance literacy but also for covering subjects relating to credit and agricultural technology. Mass media, self-help groups and other mechanisms relating to agricultural technology dissemination can play an important role in this regard. Personnel associated with agricultural extension activities should also be trained in the fundamentals and other aspects of crop insurance schemes, so that they are able to create awareness and acceptance among farmers (Government of India 2014).

According to FAO (n.d.) report, there is strong incentive to build linkages with providers of services to the farmers. Insurers, extension services and processors of farm products are ideally required to work together with farmers. The linkages reduce insurance delivery costs and

farmers' transaction costs— improving agricultural productivity and providing a safety net for small-scale farmers. As a result of such linkages, previous experience in Ethiopia shows that training on the benefits and risks of insurance helped increase uptake dramatically, from three per cent for those with a minimal amount of experience to 42% uptake for those with intensive training (Africa Growth Initiative 2011). There is no doubt that agricultural extension services are an effective mechanism for educating farmers about proper utilisation of new interventions, CI being one of them. After all, innovation has opened the door for growth in connecting inputs, finance, markets and extension services and has spurred the use of value chain financing (Miller 2011).

In light of the above brief experiences, to respond to SFs' complaints, the government needs to establish responsive extension system/services with adequate knowledge of CI and the way it functions to benefit SFs. This requires the training of extension workers jointly by NISCO, the government and other stakeholders such as WFP/IFAD, with government playing facilitation roles. Also, government will need to ensure its presence and committed support to CI initiatives. An extension package tailored towards the interests of SFs focusing on CI initiatives needs to be designed in areas where such initiatives are planned to be put up, which in practice transcends the usual strong standardisation of extension packages arising from a pronounced top-down approach in Ethiopia (Tewodaj *et al.* 2009). Public extension services assisting and supervising farmers in the management of production risks before and after the occurrence of a loss can help reduce some problems. Ethiopian farmers are known to have preferred public goods to extension package, unless combined with insurance (Carlsson et al. 2005; Davis, Swanson and Amudavi 2009). Therefore, extension service is required to be flexible enough to respond to and accommodate emerging ideas and interventions underlying CI at local levels.

4. CONCLUSIONS AND IMPLICATIONS

Even if most beneficiary SFs purchased CI without being adequately convinced about its benefits, the payout obtained as a result of harvest failure of haricot beans helped them to redress some of their problems. As a result, CI was believed to play significant roles in supporting them continue surviving the challenges of RD. The implementation of CI pilot project was challenged by inadequate information catered to and low knowledge of SFs and weak solicitation of SFs overriding preferences such as increasing payout, paying indemnity promptly, prioritising yield-based insurance, insuring multiple crops, and involvements in leadership roles. Likewise, extension service which could have facilitated the flow of information and the building up of knowledge among SFs and allowed them to overcome the above-sated challenges was missing. The degradation of the agrarian resource base and emerging environmental hostility – observed risks—

appear to have played great roles in increasing SFs' interests in adopting CI innovations — risk management strategy — in the future. This observation has an intersection with the conceptual framework of Heitzmann, Canagarajah and Siegel (2002) adopted to inform the article. With the provision of adequate and timely information as well as with effective implementation of the contractual agreement supported by favourable environment for the delivery of extension services as testified by the Indian experience (Government of India 2014), RDIB CI stands to be one of the potential options to sustaining the livelihoods of SFs in drought-prone—semiarid and arid — areas in Ethiopia.

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Notes

1. 1 US$ was about 13.23 Ethiopian Birr.
2. Further study might be required to understand differences in levels of outputs between the two groups.
3. Given the strong interest displayed by the two groups of farmers to purchase crop insurance, the sizes of both insurable average and total lands under haricot beans production seem to increase in the future.
4. *Eragrostis tef,* dominant small-grain cereal crop from which Ethiopian *Injera* – thin pancake like bread – is prepared.

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