INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN 2278 – 0211 (Online)

Exploring the Risk Exposures of Peasant Farmers in Northern Ghana

Luu Yin
Lecturer, Faculty of Mathematical Sciences, Department of Statistics, UDS, Navrongo Campus, Ghana
A. V. Boatemaa
Student, Faculty of Mathematical Sciences, Department of Mathematics, UDS, Navrongo, Ghana
Akamba Mathias
Assistant Lecturer, Faculty of Mathematical Sciences, Department of Statistics UDS, Navrongo Campus, Ghana

Abstract:
Peasant farming is an inevitable system of farming associated with rural subsistent farming. Be it crop, livestock or mixed farming, risk is equally inevitable right from the preparation of the farm, the cultivation through to the harvesting of the crops and its storage. Risk on the Agriculture industry like all facets of life, is looked at in terms of the exposure of one or an operation to uncertainties of loss. This study adopted the qualitative research design. Primary data was collected from 100 peasant farmers consisting of 20 randomly selected from five purposively sampled communities in the then Kassena Nankana Municipal. The findings of the study are that peasantry may forever exist among rural subsistent farmers in Northern Ghana with farmers cultivating less than five acres in a season. These farmers are exposed to all sorts of risks ranging from natural, social, economic to physical risks. The farmers adopt farming methods like mono or mix cropping, mixed farming and spiritual cover from their ancestors to mitigate the impact of their losses. There is no known scientific insurance policy available to cover their risks. Evaluating the insurability of these risks, it was found that most of the natural and physical risks can easily be covered by an insurance policy. The economic and social risk exposures although seems difficult to be cover as specific perils they could be integrated in a multiple risk policy. The insurer can be catered for the interventions of NADMO and other agencies to support disaster victims by applying the principles of Contribution and subrogation to ensure that the Insureds do not make profits on the claims. The study thus recommends the introduction of a micro insurance package for peasant farmers.

Keywords: *Endogenous risk management, risk exposures, peasantry, and farming*

1. Introduction

Agriculture is a profession faced with numerous risks some of which are catastrophic in occurrence. From the planning of the farm layout to actual farm operations, produce harvest, storage and marketing, a lot of risks abound. The livestock farm is also exposed to several risks which threaten the farmer's investments.

Risk is a very important determinant of farmer's decisions, and it may deeply change the level and composition of agricultural supply. For instance, guaranteed price crops are in general less risky than those without guaranteed prices. As a consequence, they are preferred by farmers, and, for the same average price level, they are supplied in larger quantities (Boussard and Gerard, 1992)[1]. In that respect, farmers can be thought of in exactly the same way as bank portfolio holders, trying to combine safe but low rewarding prospects to risky but promising ones, in order to get their own optimal risk/average level of income mix.

Agricultural risks are very wide. At various stages of agricultural production, the exposures to the farmer differ. Annan (2005)[2] in his International day for disaster reductions message indicated that "We cannot stop natural calamities, but we can and must better equip individuals and communities to withstand them. Those most vulnerable to nature's wrath are usually the poorest, which means that when we reduce poverty, we also reduce vulnerability. - Kofi Annan, Former UN Secretary-General, October 12, 2005.

Kofi Annan's 2005 International Day for Disaster Reduction message followed a year of natural catastrophes including, among others, the 2004 Indian Ocean tsunami that claimed over 280,000 lives, drought and locust plagues across Africa, devastating hurricanes and cyclones in the United States and Caribbean (including Hurricane Katrina), and heavy flooding across Europe and

[1] BOUSSARD, Jean Marc and Françoise GERARD (1992): Agricultural supply and price variability. Forthcoming, F.A.O., Roma.
[2] Annan, Kofi. (2005): Reduction, Disaster Prevention, After Year of Profound Lessons. New York: UN Department of Public Information.

Asia. Annan's message focused on recognizing the potential of micro-insurance to reduce disaster risk and to improve disaster management; he promoted disaster micro-insurance as an "innovative approach" in this field (Annan, 2005)

2. Peasant Farming

This describes small scale farm holdings cultivated for subsistence and for sale in the domestic market. Thus a peasant is a smallholding farmer, producing crops for family consumption and for market exchange, using mostly family labour throughout the farming cycle.

According to Robert Netting (1993)[3], Peasants live in villages; they engage in face-to-face relations with neighbouring farmers; they possess a diverse range of cultural and religious beliefs and practices; they fall within a diverse range of social networks and local organizations (kinship organizations, temples, labour-sharing networks).

2.1. Definition of Risk

Apart from being at the centre of insurance, risk is at the centre of life itself and as a result, people from different walks of life – Economists, Doctors, Farmers, Engineers, Psychologists, Businessmen, Scientists etc are concerned with it and have shown deep interest in the concept of risks. Consequently, several definitions of risk have emerged:

i. Risk is the uncertainty as to the occurrence of an Economic loss.
ii. Risk is the possibility of an unfortunate occurrence.
iii. Risk is the chance of loss.
iv. Risk can be defined as the exposure to danger or perils.

Clearly speaking, there can be no one authoritative and universally accepted definition of risk. Mathematically, risk can be defined as the degree of dispersion of values, in a distribution, around the central position, occurring in a random chance pattern.

For the purpose of this study, our working definition of risk will focus on **"Exposure to Uncertainty of Loss"** This definition is built around the three pillars namely exposure, uncertainty and loss. It avoids situations: where no likelihood of loss exists; which will definitely happen; or where the subject matter is not exposed to the prescribed or defined likelihood of loss.

2.2. Features of Insurable Risks in Agricultural Insurance

There are certain basic characteristics of Insurable risks. These include financial value, many homogenous exposures, pure risks only, non-catastrophic (particular and fundamental exposures), fortuitous or accidental risks, insurable interest, and not against public policy.

2.2.1. Financial Value

For a risk to be insurable, it must involve a loss that can be measured financially. On the same basis, an agricultural risk is only insurable if the loss involve is a loss that can quantified in financial terms. This is because the insurer is concerned with monetary compensation following a loss. It is difficult to settle a farmer's claim where the loss sustained cannot be quantified or measured in financial terms. For example, the cost of production of a hectare of the crop must be established and known to both the farmer and his Insurer: the value of the insured livestock (comprising purchase value plus estimated input costs) must be ascertained at the beginning of the contract. In the event of loss/damage, these values will facilitate the assessment of the claim payable to the farmer.

2.2.2. Homogenous Exposure

Another element of measuring insurability is whether there are more exposure units. Thus the agricultural risks must be a large number of homogenous exposures before the insurer can grant cover. Insurance is simply based on the law of large numbers, for example, there must be a large number of poultry farmers, crop farmers, cocoa, oil palm and rubber plantations to make the risks insurable. The reason is that financial measurement of risks by probabilities relies on reasonable experience of past events. Also, if there are few risks the premiums payable will be outrageously high if losses are to be met.

2.2.3. Pure Risks Only

Pure risks hold out the prospect of loss or no loss, for example, the factory may be burnt down or not, the farm may be invaded by pests/diseases or not. Pure risks are generally insurable and same applies in agricultural insurance. Speculative risks are considered uninsurable in the agricultural insurance.

2.2.4. Particular and Fundamental Risks

Particular risk has its origin in individual events and its impact is felt locally. Example of particular risk is the outbreak of diseases in a poultry farm. Fundamental risk is one that is impersonal both in origin and consequence. The losses that flow from fundamental risks are not normally caused by one individual and the impact falls on a wide range of people or entities. Examples of fundamental risks include war, inflation, flood, unemployment, and explosion among others. They generally arise from the nature of society we live in or physical occurrences beyond the control of man.

[3] Robert Netting (1993) Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture.

Generally speaking, particular risks are insurable while according to Yusuf, (2010)[4] only few fundamental risks arising from physical occurrences such as flood, draught, and explosion may be covered as perils of agriculture.

2.2.5. Fortuitous/Accidental Risks

The loss must be entirely fortuitous for the risk to be insurable. Agricultural Insurers do not insure events that will certainly occur. In such case, there is not risk, no uncertainty of loss as in our working definition earlier.

For example, it is certain in some parts of Nigeria and Burkina Faso that the dam authorities must (in the national interest) release excess water from the dams to avoid imminent collapse of the dams. These phenomena are regular occurrences and result in the flooding of most farms along the rivers' basins. It is a certain not fortuitous event every year hence any crop policy will have to exclude these flooding.

2.2.6. Insurable Interest

The risk must result in some kind of financial loss to enable compensation be paid to the farmer. One of the basic doctrines of insurance is that there must be insurable interest before there can be insurance cover. If the insured has no valid insurable interest in the farm project/equipment for the loss of which he receives indemnity, no cover can be granted.

2.2.7. Not against Public Policy

The risk must not offend public opinion or policy. It must not be contrary to what the society considers as right or moral. This is the reason why all agricultural insurances do not cover risks on tobacco farms or other farms where (Marijuana) and other intoxication weeds are grown.

3. Research Methodology

Qualitative research design was applied for the study. Primary data was collected from 100 peasant farmers consisting of 20 from five purposively sampled communities in a selected District. The sample size was obtained using the Slovin Formula (Umar, 2000)[5] $n = \frac{N}{1+N(e)^2}$. Where: n=sample size; N=population size (total population of the study area); and e=significance level in percentage of error allowed (ten percent).

4. Findings and Discussions

The uncertainties surrounding the farmer can be broadly classified into natural, economic, social, and physical risks. Some of these risks are insurable while others are not.

4.1. Risks of Agriculture

4.1.1. Natural Risks

Some Agricultural risks arise from the perils of nature and threatens the farmer as well as his farm investments. The natural perils/risks are not made by man and are beyond the control of man in most cases. Human beings may not have fore knowledge of its occurrence and possible effects. Examples: drought, flood, windstorm, fire, lighting, death, diseases, illness.

These are pure loss risk factors to the farm arising from the effects of natural perils. Although the first three are fundamental in character within a given location, these perils are insurable under a multiple peril farm policy. The principles of subrogation and contribution could be applied to appropriately indemnify the farmers to ensure that they do not make profits on insurance claims when any loss is mitigated by the national disaster management organisation (NADMO), the government or any other Disaster Relief Agency.

4.1.2. Social Perils

These are perils that arise from the society in which the farmer lives or the environment in which the project is situated. Examples include theft of crops/animals, riot, strike and civil commotion, malicious damage, oil spillage, war and kindred risks infidelity of the farmer or his employees, malicious/wilful injury to animals, malicious/wilful damage to crops, Acts of public authority etc. These risks pose a threat to the farmer and his farm investment.

Farmers admitted haven suffered from some of these perils. All the farmers ever suffered some theft of a kind ranging from domestic birds to cattle. Stealing of fowls are very frequent but has very little impact than the stealing of cattle and donkeys. The latter are most stolen in bulk while the former is on singular basis over time.

[4] Yusuf, K., K. 2010. *Insurance Options in Risk Management in Agriculture Finance*. Being the full text of paper presented on the occasion of the AFRACA Conference in Abuja.

[5] Umar, S.E. (2000). *Slovin's formula sampling techniques*. Norton: Demand Media, Inc.

Although bush fires are more of an annual ritual in Northern Ghana, farmers scarcely suffer losses therein. Only about 5% indicated that they suffered losses under this peril some time passed when the late millets on their distant farms were burnt when they were just organising to go and harvest.
Most of these social risks are insurable in Agricultural Insurance. For instance, theft, communal unrest / riot, malicious damage/injury to livestock by a third party can be covered under non-life policies.

4.1.3. Economic Risks
Economic perils are those that threaten the farmers' income or returns from their investment. They lead indirectly to loss of income rather than direct loss of the project itself. They are mainly perils associated with market forces and production frontiers of the industry. Examples are fluctuation in prices, loss of yield and other consequential indirect losses. Loss of yield can be covered, as it possible to accurately measured/calculate the output per a given area of land in financial terms. Loss due to fluctuation in prices of agricultural products cannot be easily calculated and therefore uninsurable. Generally speaking, all economic risks are uninsurable because of the difficulty on accurately estimating their value at the time of issuing the policy.

4.1.4. Physical Perils
These are perils associated with the physical nature of the project itself or its location, for example, a defective storage system may collapse, the pen building if defective may go down, loss or damage to property occasioned by its own fermentation, natural heating or spontaneous combustion. Physical risks may be management-related risks such as negligent farm management, late planting, poor selection of seedlings or farm site and non-compliance with established calendar of operations. Other examples of physical risks include nuclear risks, poor agronomic practices, poor soil condition etc.

4.2. Management of Agricultural Risk

Risk can generally be managed by:

a. Avoiding being exposed to the peril / hazard
b. Control the exposition, the chances of occurrence, and/or the magnitude of the loss if the event occurs;
c. Retention of the Loss; and
d. Transferring it to a third party under a mutual agreement (i.e. by contract);

These are now discussed below.

4.2.1. Avoidance of Risk Exposures
It is the process of skipping all hazards and perils that exposes the risk bearer to the possibility of the loss occurring. By avoidance, the risk bearer eliminates the chances of loss. This may mean selecting a business location where a particular peril is not present, or a particular product line that is not exposed to a given undesirable risk.
Some perils or risk exposures are unavoidable when a particular business activity is chosen or embarked upon. In such cases the best option is to develop and implement loss control strategies. Peasant farmers fall into this category of not being able to avoid most of the risk the environment generates for them. That is uncontrollable rainfall patterns, windstorms on rainy days, droughts during farming seasons, pest and many other hazards. This implies that all the natural hazards of peasantry are unavoidable.

4.2.2. Control of Risk
This consists of activities that reduce both the frequencies and severity of losses that are inevitable and are likely to occur in our daily business activities of personal lives. Peasant farmers are very much aware of many strategic safety measures and apply them to control their risk exposures. Most of these measures are formulated as taboos while others are mere sayings in their daily talks but are valued and applied as safety guides.

a. Loss Prevention: decrease the probability of loss (frequency of loss)

→ Personal Accident –Scientifically specific series of safety precautions are developed to control accidents in various working environments and social settings. Peasantry equally have some oral safety guides although they are not seriously followed by many. The study revealed, for instance, that 'it is a taboo to be weeding when you cannot see your toe nails else your mother and mother-in-law will die at the same time'. There is actually no such incident ever reported although some farmers violate the taboo. The elderly members explained it to be a 'saying' rather than a taboo because every taboo has a deity's pacification when breeched but this statement defined no pacification. They added that, the statement is to minimise the chances of injuring oneself when working after darkness has fallen. The contextual meaning of the statement carries a contrary view from its literal implications. Literally, the farmer will suffer financially and emotionally to bury his mother and mother-in-law within a short interval or even the same time if they should die at the same time. So in order not to suffer that cost even if he hated them and wish they were not there, will not intentionally want to cause their death at one time. Contextually the statement is coded to scare the younger generations to minimise dangerous farming practices. The farmer getting injured may not be able to continue the work for the rest of the season. The mother and wife will then be forced to continue. If they are not able to control the farm properly they may not have enough to feed on during the dry season hence the wife may have to seek assistance from her mother to support. Thus the mother and mother-in-law do not literally die but rather suffer the hardship the energetic farmer will put on his beneficiaries as a result of his injury / incapacitation.

→ Physical Perils on the farm may be prevented by creating fire belts while foodstuffs are yet to be harvested[6]. Keep the farm under control in terms of weeding, application of manure / fertilizers, and strategically monitor the farm to keep ruminants and other evaders from entering to destroy your produce.

The adoption of varying farming practices helps to address some aspect of the risk of poor soil fertility, as well as diversify the risk of crop failure with live stock by way of mixed farming.

- Health – stop or minimise smoking; control your consumption of alcohol and tobacco.

b. Loss Reduction: decrease the magnitude or the severity of the inevitable loss.

- Avoid farming very close to river banks so as to reduce the magnitude of flooding on your farm. Ensure that your livestock don't stray all day and night and especially to distant places without being monitored. This will reduce the chances of theft and livestock getting lost in the bush or straying to very far distant communities.

4.2.3. Retention of Risk

Otherwise known as risk assumption, retention means the bearing of the consequences of the loss by the party exposed to the chances of loss. The retention could be active or passive.

- Active – bearer is consciously aware of the risk and deliberately plans to retain all or part of it. Mostly, this occurs when the magnitude of the loss identified is very small. The peasantry case is obvious in this wise except that their retention is because they have no immediately available option. There are records of farmers recording terribly poor yields but yet they will not quit peasantry
- Passive - risk is unknowingly retain because of ignorance, indifference, laziness or not identified. Secondary data from the Ministry of Food and Agriculture as in table 1 below indicates that farmers do not meet the standard output as per the expected output in a typically controlled farming environment.

Year	Standard	Act. Millet	Act. Maize	Act. Rice
2007	502,458.7	625.02	919.45	1045.2
2008	370,867.4	823.8	546.09	1604.5
2010	454,156.7	108.24	522.62	3950.5
2012	222,216.2	547.9	394.18	2663.2
2013	156,48.80	194.6	4,004.4	1647.5

Table 1: Output of Standard against Actuals (Cereals)
Source: MOFA (2014)

Year	Standard	Agg. Output	Relative Output
2007	502,458.70	2,589.67	0.515%
2008	370,867.40	2,974.39	0.802%
2010	454,156.70	4,581.36	1.009%
2012	222,216.20	3,605.28	1.622%
2013	156,480.80	5,846.50	3.736%

Table 2: Comparison of Standard Output and Aggregate Actual Output of Cereals
Source: MOFA (2014)

Table 2 above exhibits the quantum and relative output of production over a period of seven years. These are the periods where output was relatively good and applauded by farmers and the Ministry of Food and agriculture at the Regional level.

It is however worth indicating that over the years' output has been consistently improving. This could be attributed to the many interventions made to improve agriculture by various agents including the government.

Nonetheless the actual level of output amidst the numerous interventions is still far below 5% the standard output. Peasant farmers, per this their plight, involuntarily but actively retain the losses of producing far below 10% of the expected output levels and yet suffer the consequences of all the hazards associated with their industry.

4.2.4. Transfer of Agriculture Risk

There are several possible ways of transferring Agricultural risk. Most of these are usually associated with commercial farming. Farm crops can be released to a financier to harvest when the crops are ready. Under these circumstances, the farmer will normally receive prepayment for the crop in the form of a loan and pledge the produce for repayment. By this agreement the risk of poor yield, theft of crops from the farm and other moral hazards on the crops while they are still on the farm or are being harvested are transferred to the financier. Crops could also be sold at a hedged price prior to harvesting the produce. This arrangement only covers the risk of price fluctuation and not yield from the farm.

[6] Most communities forbid bush burning until the latest post harvest festival is celebrated. When one is caught burning the bush s/he must pacify the gods and pay for any property damaged by the fire. If nobody saw the culprit, s/he must still pacify the gods else his /her family may suffer the curses of the gods. The Tindana (community spiritual leader) indicated that this had negatively affected many families and they had to pay bigger pacification penalties to control the calamities on them.

The most common transfer of risk is by taking an insurance cover. Agricultural Insurance is a financial tool to transfer production risk associated with farming to a third party via payment of a premium that reflects the true long-term cost with the insurer assuming those risks. Unfortunately, the peasants of the study area have little or no knowledge of insurance to cover their farms and none has taken an insurance cover before.

Concern for risks that stifle investment and contribute to vulnerability of the rural people is a driving force behind various types of agricultural insurance (typically crop insurance). Insuring small scale farmers against crop losses to adverse weather or other hazards has attracted public sector involvement in the provision of agricultural insurance in many countries. These insurance products are the reason for the Deutche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, support for the Promotion of Insurance in Ghana.

Most of the respondent farmers were indigenes of the sampled communities where traditions and religious practices dominate. These farmers believe that they take cover under their Ancestors who are able to ward away windstorms, control prolong droughts as well as moderate excess rainy periods. These confirm (Millar, 2012)[7] that the African Cosmovision is built on three pillars - material, social and spiritual. The spiritual pillar serves as a link between the living, the dead, and even the unborn in society. Thus the dead ancestors still have roles to play in the wellbeing of the surviving later generations and are therefore consulted for protection against most of the fundamental risk exposures.

4.3. Insurability of the Agricultural Risk Exposures

We often see from our televisions some major disasters such as fire outbreak, explosions, earthquakes, armed robbery incidents, collision on our motor ways or a workman injured or dead at site.

Human beings, animals, properties including farms are exposed to one form of risk or another. Businesses are similarly confronted with different risks as factories may be destroyed by fire, large number of hectares of crops may be washed away by flood, valuable stock could be stolen, an epidemic can wipe out an entire livestock farm worth several millions of Ghana cedis among others.

Once these events occur in life, a great deal of anxiety and grief may result. Insurance is a mechanism used to alleviate the financial hardship which may result. Risk is at the centre of insurance. In the Agriculture Sector, insuring the risks associated with all aspect of the processes and properties of a given farm require a multi-risk policy.

Considering the pre-requisites of an insurable risk, most agric risks turn to be fundamental, and catastrophic if the exposure units are not geographically diversified.

5. Summary of Findings, Conclusions and Recommendations

5.1. Summary and Conclusions on Findings

The findings point clearly to the fact that peasantry is inevitable in rural Ghana. They are largely exposed to all the hazards any farmer is exposed to. Natural hazards are mostly uninsurable per the characteristics of an insurable risk. Physical, economical and social risks are more tolerable in the insurance industry and can easily be catered for.

Their dependency on rain, natural fertility of the soil, and the natural environs for their farming activities toads their level of productivity. They are not able to avoid losses. They instead, find means of reducing the impact of the loss occurrences. They adopt safety measures, practice a combination of some of these cultivating methods, mono cropping, mixed cropping and mixed farming to mitigate the impact of their unavoidable risk exposures.

Aside from these physical efforts, they also back these with the support of their ancestors in the spirit world.

5.2. Recommendations

Our recommendations as per the findings of the study are directed on Insurance Companies, peasant farmers and the Ministry of Food and Agriculture (MFOA).

Insurance Companies should roll out Micro Insurance Products to cover the peasant farmers' risks. The prospective insurers should liaise with MOFA to sensitise farmers on the benefits of insuring their crops and animals so as to widen the prospect of the cover.

MOFA should aid farmers to enhance their level of productivity to take advantage of the potential risk transfer to insurer. This aid could be in the form of extension officers' services, fertilizer lending to farmers, implications of climatic conditions to help them decide on their cultivation plans.

Farmers should explore the opportunity of transferring their risk to insurers when policies are finally rolled out to address their insurance needs. Farmers should venture into challenging zones of their industry to diversify and expand their operations and output when policies are there to cover their potential insurable losses.

Groups Interested in Famers and Food Sustainability issues should support the peasant farmers to secure their property and farming operations by supporting them to pay for their premiums when the opportunity for insurance comes up.

[7] Millar, D. (2012) *Our Sciences: Indigenous Knowledge Systems of northern Ghana,* UDS, (P. 8)

6. References

i. Annan, Kofi. (2005): Reduction, Disaster Prevention, After Year of Profound Lessons. New York: UN Department of Public Information.
ii. BOUSSARD, Jean Marc and Françoise GERARD (1992): Agricultural supply and price variability. Forthcoming, F.A.O., Roma.
iii. Millar, D. (2012) Our Sciences: Indigenous Knowledge Systems of northern Ghana, UDS, (P. 8)
iv. Robert Netting (1993) Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture .
v. Umar, S.E. (2000). Slovin's formula sampling techniques. Norton: Demand Media, Inc.
vi. Yusuf, K., K. 2010. Insurance Options in Risk Management in Agriculture Finance. Being the full text of paper presented on the occasion of the AFRACA Conference in Abuja.
vii. Agarwal, S., & Ramaswami, S. N. 1992. Choice of foreign market entry mode: impact of ownership, location and internationalization factors. Journal of International Business studies, 23(1): 1-28.
viii. Aizenman, J., and B. Pinto. 2005. "Overview" In J. Aizenmann and B. Pinto, eds., Managing Economic Volatility and Crises. Cambridge, United Kingdom: Cambridge University Press
ix. Amonoo, et al. 1977. "A Strategy for an Integrated Rural Development in Ghana," in Rural Development in Ghana. Ghana Universities Press, Accra, Ghana.
x. Chayanov, A.V. (1966), The Theory of Peasant Economics, ed and introd. By Daniel Thorner, Basile Kerblay and R.E.F. Smith, Irwin, Homewood, Illinois.
xi. Anderson J.R and Roumasset J.A., (1996), "Food Insecurity and Stochastic Aspects of Poverty," Asian Journal of Agricultural Economics, 2(1): pp. 53-66
xii. Anriquez G and G. Bonomi (2007), "Long-term farming trends: an inquiry using agricultural censuses", ESA FAO working paper 07-20
xiii. Chrism J.; Levins R. (1994) "Farm" Minnesota Agricultural Economist spring 1994 (676)
xiv. Diao X., P. Hazell, D. Resnick, and J. Thurlow. (2006), "The role of agriculture in development: Implications for Sub-Saharan Africa" IFPRI Research Report No. 153
xv. Eastwood, R., M. Lipton, and A. Newell. 2007. Farm size. Chapter prepared for R. Evenson and P. Pingali (eds.) Handbook of agricultural economics. Vol. 3, Agricultural development: farmers, farm production and farm markets.
xvi. Ellis, F. (1998), Peasant Economics: Farm Households and Agrarian Development, Cambridge, 2nd edn, University Press, Cambridge
xvii. Fleisher B. (1990). Agricultural Risk Management, Lynne Reinner Publishers, Boulder, Colorando, USA.
xviii. Gorelick, Steven, Norberg-Hodge, Helen (2002). Bring the food Economy Home: Local alternative to Gobal Agro-business. Kumarian Press (US) Retrieved 5th Nov. 2014
xix. Hussels, Ward and Zurbregg, 2005, Outrevill, 1990. Weather Risk Transfer in Mali.
xx. Joy Harwood, Richard Heifner, Keith Coble, Janet Perry, and Agapi Somwaru. Market and Jayne, T.S., T. Yamano, M. Weber, D. Tschirley, R. Benfica, A. Chapoto, and B. Zulu. (2003). "Smallholder income and land distribution in Africa: Implications for poverty reduction strategies". Food Policy 28: 253–275.
xxi. Kahan D.(2008), managing risk in farming Food and Agriculture Organization of the United Nations Rome 2008.
xxii. McCullough E, P L. Pingali, and K G. Stamoulis, eds (2008), "The transformation of agri-food systems: globalization, supply chains and smallholder farmers", FAO and EarthScan
xxiii. McConnell, D. J., Dillon, J. L (1997), "Farm management for Asia: a systems approach", FAO Rome.
xxiv. R M &J Yeomans Forestry &Firewood was started by Husband and wife Team, Rohan & Joy Yeomans and established in 1999.
xxv. Schluter, M. G. G, and Mount T .D. (1976). Some management objectives of the peasant farmer: An analysis of risk aversion in the choice of cropping patterns, Surat District, India. Journal of Development Studies 12:246–61.
xxvi. VonBraun, J., 1989. The Importance of Non-Agricultural Incomes for the Rural Poor in African and Implications for Food and Nutrition Policy. Washington, DC: International Food Policy Research Institute