

Extension Services for Effective Agricultural Risk Management in Orlu Agricultural Zone of Imo State, Nigeria

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Abstract: The business of farming and agriculture in general is very risky. The risks may be as a result of man-made or natural causes. Farmers or agricultural producers are at the receiving end of the outcome of the risks. Agricultural producers need to be helped in the face of these risks occurring at an unpredictable time. The help farmers need to cope is the crux of this study – Extension services. This study examined the services agricultural extension render to manage these risks. The study looked at the demographic characteristics of respondents, risks faced by respondents, information risk areas, management of these risks and role extension play for managing risks. A total of 130 farmers were selected purposively from ADP list of registered farmers. Questionnaires were used to get information from the farmers. Majority (43.7%) of the farmers are within the active age of farming. They all receive extension visits, 49.2% have secondary education, 40% have 0.25 – 1 hectare of farmland. They face risks such as bad weather, pests and diseases outbreaks, fire outbreaks, flooding, financial and credit risks among others. To manage risks, extension provide information, share knowledge, link farmers to input points, educate and train farmers, build capacity, reduce vulnerability, support farmers organizations and others. The respondents also diversify crops, practice mixed cropping, share cropping, migrate to other areas, reallocated labour and store enough for used during difficult times.

Keywords: Agriculture, risk, extension services, management, information.

INTRODUCTION

Risk and uncertainty are ubiquitous in agriculture and have numerous sources: the vagaries of weather, the unpredictable nature of biological processes, the pronounced seasonality of production and market cycles, the geographical separation of producers and end users of agricultural products, and the unique and uncertain political economy of food and agriculture within and among nations[1]. Managing agricultural risk is particularly important for smallholder farmers, who are usually already vulnerable to poverty and lack the resources to absorb shocks. Typical shocks such as drought or a pronounced drop in market prices prevent poor households from acquiring assets or making the most of the assets they have[1]. They push families into poverty and cause extreme hardship for those already in poverty. Exposure to risk prevents farmers from easily planning ahead and making investments. In turn, risk inhibits external parties' willingness to invest in agriculture because of the uncertainty about the expected returns. Improved management of agricultural risk has significant potential to increase productivity enhancing investments in agriculture[2].

For the millions of small-holder farmers in developing countries, agriculture remains a risky business, yet they persevere for want of an alternative[3]. Small-holder farmers are expected to produce sufficient food for home consumption and to compete in local and international markets; where price, quality, food safety, nutrition and ethical issues determine consumer choices. They do so with limited resources - land, capital, credit and support from extension and other services and often, under very challenging circumstances which many consider as hostile to their efforts at breaking the cycle of poverty[3]. These challenges include; unfriendly policy and institutional environments, high interest rates on loans, international trade rules, uncertain markets and stringent market requirements, fluctuating commodity prices, climatic variability/change, a depleting natural resource base (especially land and water), energy and economic insecurity, and limited access to research, education and extension services that respond to their priority needs.

If the agricultural sector is to adequately contribute to national economic growth, its total factor productivity simply has to increase. Application of

appropriate knowledge to the production systems is the key for increasing productivity. Yet, the current extension systems which are the main conduit for knowledge transfer to farmers do not address the strategies that farmers could use to reduce their risks. In addition to appropriate educational content, the organizational and human capacity of the extension system needs to be improved so as to identify the sources of risk for farmers and to subsequently develop strategies to mitigate those risks. That such change should be an essential part of the extension system reforms currently being designed and implemented in developing countries could hardly be overemphasized.

Extension and advisory services is seen as consisting of all the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organizational, and management skills and practices so as to improve their livelihoods and well-being[4]. It envisions much broadened support to rural communities (beyond technology and information sharing), including advice related to farm, organizational, and business management; and facilitation and brokerage in rural development and value chains. It is well known that the rural poor even in the study area are characterized by insufficient asset holdings, numerous market failures, unfavourable terms of market participation, large institutional gaps, and lack of access to public goods and services, in particular to improved agricultural technologies, resulting in not also poverty but also vulnerability to risks of change in their biophysical and economic environments. Yet there is lack of information on these farmers cope and this necessitate the study.

The specific objectives are to:

1. Describe the socio-economic characteristics of the farmer in the study
2. Identify agricultural risks faced by farmers,
3. Ascertain risk information needs of respondents
4. Identify agricultural extension services for agricultural risk management;
5. Identify risk management strategies of farmers

METHODOLOGY

This research was carried out in Orlu agricultural zone which is among the three agricultural zones in Imo State. The zone is made up of twelve local government areas (LGA) in the state. The 12 LGAs are Njaba, Nkwerre, Orlu, Orsu, Ideato North, Ideato

South, Oru West, Oru East, Nwangele, Ohaji/Egbema, Oguta, and Isu. The area is situated in the South-eastern region of Nigeria with heavy annual rainfall. The area experiences the same two distinct season that are predominant in tropical Nigeria namely : rainy season, Ranging from March to September and dry season, ranging from October to February. The major occupations of the people in this area are trading and farming. Data for this study were obtained from two main sources namely: primary and secondary sources. The primary sources of data were collected using structured questionnaire while the secondary data were obtained from Journals, books, and other relevant materials. Purposive random sampling technique was used for this study. The respondents were 130 contact farmers registered with the Orlu zonal office of Agricultural Development Project. Data collected from the field were analyzed using descriptive statistical tools of analysis such as percentage presented in tabular forms.

RESULTS AND DISCUSSIONS

Socioeconomic Characteristics of Respondents

Table 1 reveals the socioeconomic characteristics of the respondents. Majority (43.1%) are within the age bracket of 51 – 60 years. They are followed by 26.9% who are between 41 – 50 years. These groups are active farmers and this shows why they are in the business of arming. Again, 53.8% are married, 34.6% are widows who have lost their husbands and are fending for themselves and family. Majority (40.7%) have large Family size of between 9 – 12 dependents, 30.7% have 5 – 8 individuals in their families. This high number of people is evident in the fact that most times, the farm owners use family labour when hired labour is not in sight. The respondents (47.6%) have put in 10 years and above in farming. This explains why they are aware of risks and uncertainty in farming and eagerly seek extension and advisory services to cope.

The respondents (40%) have small farm size (landholding) of 0.25 – 1 hectare, 28.4% have 1.5 – 2 hectares, 17.6% have 2.5 – 3 hectare, while 13.8% have more than 3.5 hectares of farmland. The greater majority (40%) is disadvantaged in terms of landholding. Majority, (92.3%) belong to social organization, 48.2% have secondary education, 31.5% have primary education, while only 19.2% have tertiary education. Education plays a crucial role in farm management capacity, adoption of innovation understanding of practices and ability to make changes fast.

Table 1: Socioeconomic Characteristics of Respondent

Attribute	Frequency	Percentage
Age		
31 – 40	18	13.8
41 – 50	35	26.0
51 – 60	56	43.1
61 and above	21	16.2
Marital Status		
Married	70	53.8
Widow	45	34.6
Widower	15	11.5
Household Size		
1 – 4	15	11.5
5 – 8	40	30.7
9 – 12	53	40.7
13 and above	22	16.9
Farming Experience		
1 – 5	23	17.6
6 – 10	45	34.6
10 and above	62	47.6
Farm size		
0.21 – 1	52	40
1.5 – 2	37	28.4
2.5 – 3	23	17.
3.5 and above	18	13.8
Association Membership		
Yes	120	92.3
No	10	7.6
Educational Level		
Primary	41	31.5
Secondary	64	49.2
Tertiary	25	19.2

Agricultural Risks faced by Respondents

Farmers face myriads of risks and uncertainty in their farming business. Table 2 below shows the risks farmers face in the study area. The major risk faced by the respondents is that of illness and loss of labour (97.6%). A healthy farmer is a wealthy farmer. When a farmer is sound, he can do any type of farming activities. But when a farmer is ill, he does less when it comes to physical activities of the farm. Another major risk is the outbreak and incidence of pests and disease (96.2%). Pest and disease outbreak hinders the growth of crops, destroys agriculture produce both in store and farm. When pests and diseases attack crops, yield loss and reduction occur, food supply declines, quality and quantity of food produce reduces and diseases. Other risks in farming business include perishability of produce (92.3%), bad weather conditions (88.4%), price volatility/fluctuation (90%), financial and credit risks (84.6%), flood/drought (82.3%), fire outbreak (75.3%), soil erosion and land degradation (68.4%), and technology risk (71.5%).

Supporting the findings, World Bank[2] posited that agricultural risk is associated with negative outcomes that stem from imperfectly predictable

biological, climatic, and price variables. These variables include natural adversities (for example, pests and diseases) and climatic factors not within the control of agricultural producers. They also include adverse changes in input and output prices. Agriculture is often characterized by high variability of production outcomes or, production risk. Unlike most other entrepreneurs, agricultural producers are not able to predict with certainty the amount of output that the production process will yield due to external factors such as weather, pests, and diseases.

Agricultural producers can also be hindered by adverse events during harvesting or collecting that may result in production losses. Input and output price volatility are important sources of market risk in agriculture. Prices of agricultural commodities are extremely volatile[5]. Output price variability originates from both endogenous and exogenous market shocks. Segmented agricultural markets will be influenced mainly by local supply and demand conditions, while more globally integrated markets will be significantly affected by international production dynamics. In local markets, price risk is sometimes mitigated by the “natural hedge” effect in which an increase (decrease) in annual production tends to

decrease (increase) output price (though not necessarily farmers' revenues). In integrated markets, a reduction in prices is generally not correlated with local supply conditions and therefore price shocks may affect producers in a more significant way [2].

Another kind of market risk arises in the process of delivering production to the marketplace. The inability to deliver perishable products to the right market at the right time can impair the efforts of producers. The lack of infrastructure and well-developed markets make this a significant source of risk in many developing countries[6]. The way businesses finance their activities is a major concern for many

economic enterprises. However, in this respect, agriculture also has its own peculiarities. Many agricultural production cycles stretch over long periods of time, and farmers must anticipate expenses that they will only be able to recuperate once the product is marketed. This leads to potential cash flow problems exacerbated by lack of access to credit and the high cost of borrowing[2]. These problems can be classified as financial risk. Another important source of uncertainty for agricultural producers is institutional risk, generated by unexpected changes in regulations that influence producers' activities. Changes in regulations can significantly alter the profitability of farming activities.

Table 2: Agricultural Risks faced by Respondents

Forms of Risk	Frequency *	Percentage
Bad weather condition	115	88.4
Pests and diseases outbreak	125	96.2
Fire outbreak	98	75.3
Soil erosion menace/land degradation	89	68.4
Price volatility/fluctuations	117	90
Perishability of produce	120	92.3
Illness and loss of labour	127	97.6
Financial and credit risk	110	84.6
Flood/drought	107	82.3
Technology risk	93	71.5

* Multiple response

Information needed to mitigate risk

To be resilient and adapt to changing agricultural environment and uncertainty, farmers need information as a form of empowerment. Information is power. This helps a farmer to prepare for the worse and unexpected uncertainty and risk associated with farming business. Table 3 reveals the types of information's respondents need to adapt to the risky weather. The respondents said they need information on prices and market (98.4%), water and soil management (83.8%), weather and climatic conditions (100%), consumer demand (69.2%), quality standards (64.6%), access to credit points (80.7%), crop type to grow (58.4%), best practices technology for increase yield and income (73.1%) and pest and disease outbreak (96.2%).

In order to provide information about weather conditions, the occurrence of natural disasters (for instance floods, drought, a tsunami), or about market prices or government policies etc., a knowledge of the specific data about the farmer, his land and his crop is a prerequisite[7]. Lack of information increases the risk and uncertainty that the farmer faces on a day-to-day basis. Information can play an important role in

mitigating the farmer's production and market risks. All farmers face production risks irrespective of their location and crops due to uncertainty of rainfall, variability in temperature, and bad or unpredictable weather conditions. These factors can variously lead to soil erosion, poor soil quality, increased incidences of pests and diseases, and low yields [7]. There is a need for fundamental information about expected weather conditions and about general know-how: which crops to plant, which seed varieties to use, what the best cultivation practices and farm management practices are for that area, and the best suitable technology available locally.

Market Risks: these arise mainly from either over- or underproduction leading to a discrepancy between supply and demand. An inadequate supply of inputs, for example seed or local labor, will lead to an insufficient yield for market requirements, whereas overproduction will impact unfavorably on the market price[7]. Lack of market information such as prices, demand indicators, and logistical information can lead to higher production costs, increased transportation costs, higher search costs and wages.

Table 3: Agricultural Risk Information needs of Respondents

Information Needs Area	Frequency	Percentage
Price and market information	128	98.4
Water and soil management	109	83.8
Post harvest information	97	74.6
Safety standards	70	53.8
Regulatory structures	60	46.2
Weather and climate change information	130	100
Consumer demands	90	69.2
Quality standards	84	64.6
Access to credit points	105	80.7
Crop type to grow	76	58.4
Best practices /technology	95	73.1
Pests/diseases control/outbreak	125	96.2

* Multiple response

Extension Services for Risk Management

A close-look at table 4 shows services rendered by Extension for farmers to adapt and build resilience in the face of climate variability. The first and foremost service rendered by extension is the provision of information to farmers as indicated by 97.6% response. The second and major service is knowledge sharing among stakeholders (91.5%). Other services are input provision linkage (93.8%), education of farmers (92.3%), reducing vulnerability (75%) developing micro-enterprises(58.4%), support to farmer organization (79.2%), create farmers learning group (74.6%) increase awareness (60%), enhance voice of the poor (80%), and capacity of farmers (87.6%).

By ensuring that farmers have information, skills, markets, technologies, and other services, extension and advisory services can improve the quality, diversity, volume, and accessibility of food to tackle hunger and malnutrition. Extension outreach to families in the form of educating for nutrition, developing skills for preparing food, and promoting health will also help mitigate the impact of hunger and malnutrition in communities. As one half the world's poor are smallholder farmers, extension services that provide information, training, linkages for marketing, price discovery, and economic skills provide a mechanism to break the poverty cycle. There is a further role for extension outreach to individuals and families by providing products to market and sell, that will also help to alleviate poverty. Extension also plays a key role in sharing information to further environmental sustainability – including limiting deforestation, fostering biodiversity, and protecting water.

According to Davis and Sulaiman[8], Extension and Rural advisory services (RAS) are crucial to putting farmers' needs at the centre of rural development, ensuring sustainable food security and poverty reduction, and dealing with risks and

uncertainty. Knowledge-sharing mechanisms must focus on critical areas including protecting natural resources, productive farming processes, product development, marketing skills, nutritional needs, and household health.

Knowledge sharing is critical for sustainable development. More and better agricultural extension and advisory services are a legacy outcome that allows knowledge-based infrastructure to adapt to changes in agriculture farming services, they are best met through improved practices based on knowledge. In addition to the traditional role of promoting agricultural innovation and technology adoption, these services now must deal with myriad issues, including human nutrition, risk and disasters, climate change adaptation, and rebuilding after emergencies. These issues present additional challenges not only to the extension workers but especially to the farmers themselves [9]. If these challenges can be overcome, extension and advisory services may be able to aid in enhancing the resilience of farmers in several ways. One way is by acting as a coordinating body for multiple support organizations as well as by providing more relevant services. A strong extension and advisory system is well positioned to coordinate multiple groups at various stages of a shock because of its linkages at local, sub-national, and national levels. Due to its potential access to timely information, the system can identify relevant actors with whom to work to ensure that intervention strategies are harmonized, relevant, effective, and timely. In this way, short-term emergency responses can be harmonized with long-term resilience-building strategies.

From the service angle, another possible way extension and advisory services could enhance farmers' resilience is by providing information and knowledge regarding weather and climate change, market prices, regulatory structures, quality standards, and consumer

demands so that farmers can make informed decisions[4]. The services could also help identify the households most vulnerable to shocks and develop a database of those who need external assistance so that they can be cost-effectively targeted. However, such roles of extension and advisory services critically depend on how effectively the extension system is funded, organized, and implemented.

Extension/advisory agents can play a role in informing providers of what inputs are appropriate in the affected areas and which ones could be locally sourced[4]. Extensionists can also help farmers learn how to use new varieties. As an intermediary institution, with knowledge of markets and natural resource management regimes, extension and advisory services can in theory help to ensure that agricultural rehabilitation programs are relevant and sustainable. These services may often be the only agencies operating in rural areas that are able to assist after a disaster. For example, Malawi's Starter Pack Scheme distributed packages of high-yielding seeds and fertilizer to farmers to help them overcome the country's drought-prone conditions. The program relied on extension agents to register farmers and distributed the packs via NGO-run distribution centers[10].

Regarding *climate change*, a core challenge for extension and advisory services in the future is shifting from providing "packages" of technological and management advice to supporting farmers with the skills and information they need to make informed decisions[11]. Climate change increases not only year-to-year but even day-to-day variability. Farmers

thus need high-frequency access to weather data as well as training in how to interpret the data and adapt their farming practices as necessary. Some will also need access to new technologies and management options in areas where climate change or other shocks or stresses render their existing farming systems unviable[12].

Information-sharing tools such as information and communication technologies (ICTs) are another area at the nexus of these services and resilience. Farmers' exposure to risk and uncertainty is often aggravated by lack of information about weather, inputs, farm management practices, or market prices; this lack of information can have an adverse impact on crop production and income. Hence, a farmer who receives quality, up-to-date information and has the ability to use it may be able to lessen the effects of these risks[13]. Mobile-based information services can influence the behavior pattern of farmers, which can in turn facilitate the dissemination of information and the adoption of improved techniques, leading to better yields. Information about weather and prices could potentially help farmers reduce their production and market risks. While information sharing and the use of tools such as ICTs can potentially reduce risks, *mechanisms such as weather insurance* can compensate for risks that have occurred. Extension and advisory services can possibly play a brokering and facilitation role in new insurance options. For mitigating risk, extension services can link up different stakeholders, including smallholders, researchers, insurance providers, input dealers, and other market players [8].

Table 4: Extension Services for Risk Management

Extension Services	Frequency	Percentage
Information provision	127	97.6
Knowledge sharing platform	119	91.5
Input provision linkages	112	93.8
Market linkages	107	82.3
Education/training of farmers	120	92.3
Champions agricultural rehabilitation programme	80	61.5
Reducing vulnerability	98	75.3
Developing micro-enterprise	76	58.4
Strengthens and support farmer organization	103	79.2
Convene and crate farmers learning group	97	74.6
Create increase awareness	78	60.0
Enhancing the voice of the poor	104	80
Technical capacity building of faremrs	114	87.6

* Multiple response

Respondents Risk Management Strategies

Table 5 shows that the first strategy for managing risk in agriculture is to avoid exposure to risk (53.8%). Crop diversification with 92.3% is another strategy employed by respondents to manage risk in

agriculture. Mixed cropping (100%), share cropping (86.9%), use of improved farm inputs (98.4%) buffer stock accumulation of crops (87.6%), labour reallocation (71.5%), extension advice/education/training (96.2%), sale of assets

(71.5%) and income diversification (80.7%) are all strategies the respondents employ to manage risk. Others migrate to other places (94.6%) as a form of management strategy, and insurance (11.5%) for farmers who can afford the provision.

Ex ante informal strategies are characterized by diversification of income sources and choice of agricultural production strategy. Once producers have decided to engage in farming activities, the production strategy selected is an important means of mitigating the risk of crop failure. Traditional cropping systems in many places rely on crop diversification and plot diversification. Crop diversification and intercropping systems are means to reduce the risk of crop failure due to adverse weather events, crop pest or insect attacks. Morduch [14] presents evidence that households whose consumption levels are close to subsistence (and are therefore highly vulnerable to income shocks) devote a larger share of land to safer, traditional varieties of rice and castor than to riskier, high-yielding varieties.

Morduch also finds that near-subsistence households spatially diversify their plots to reduce the impact of weather shocks that vary by location. Apart from altering agricultural production strategies, households also smooth income by diversifying income sources and thus minimizing the effect of a negative shock to any one of them. According to Walker and Ryan [15], most rural households in villages of semi-arid India surveyed by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) generate income from at least two different sources; typically crop income and some livestock or dairy income. Off-farm seasonal labor, trade and sale of handicrafts are

also common income sources. The importance of income source diversification as part of risk management is emphasized by the Rosenzweig and Stark[16], finding that households with more farm profit volatility are more likely to have a household member engaged in steady wage employment.

Crop-sharing arrangements in land renting and labor hiring can also provide an effective way of sharing risks between individuals, thus reducing producer risk exposure[17]. Other risk sharing mechanisms, such as community-level risk pooling, occur in specific communities or extended households where members of the group transfer resources among themselves in order to rebalance marginal utilities[18]. These kinds of arrangements are effective for counterbalancing consequences of events that affect some members of the community, but do not work well in cases of covariate income shocks[17]. Ex post informal income-smoothing mechanisms are typically the sale of assets, such as land or livestock. It is argued by Gadgil et al.[19] that southern Indian farmers are able to quickly shift from 100 per cent on-farm labor activities to largely off-farm activities if the monsoon rains are expected to be poor.

Government action plays an important role in agricultural risk management both ex ante and ex post. Ex ante education and services provided by agricultural extension help familiarize producers with the consequences of risk and help them adopt strategies to deal with risk[20]. Governments also reduce the impacts of risk by developing relevant infrastructure and by adopting social schemes and cash transfers for relief after shocks have occurred.

Table 5: Respondents Risk Management Strategies (N=130)

Strategies	Frequency	Percentage
Avoiding exposure to risk	70	53.8
Crop diversification	120	92.3
Mixed cropping	130	100
Share cropping arrangement	113	86.9
Insurance	15	11.5
Migration to farmland elsewhere	123	94.6
Income diversification	105	80.7
Sale of asserts	93	71.5
Extension advice/education	125	96.2
Social assistance	40	30.7
Use of improved farm inputs	128	98.4
Reallocation of labour	93	71.5
buffer stock accumulation of crops	114	87.6

* Multiple response

CONCLUSION

Extension services play a crucial role in reducing and managing risks for small-holder farmers. Extension should support small holders farmers at risk

through facilitation, networking and brokering for risk management. Extension services worldwide should be reformed to cope with the challenges of farming in this 21st century.

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