International Journal of Innovative Research in Social Sciences and Strategic Management Techniques
p-ISSN: 2465-728X | e-ISSN: 2467-8155
Volume 8, Number 1 January, 2021
IJIRSSSMT

Value Chain in Maize Production Towards Enhancing Livelihood of Rural Farmers in Garko LGA, Kano State

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Article DOI: 10.48028/iiprds/ijirsssmt.v8.i1.10

Abstract

The study analyzed value chain in maize production towards enhancing the livelihood of rural farmers in Garko Local Government Area of Kano State. The specific objectives were to establish the extent to which demographic characteristics of maize farmers, activities involved in maize production, extent to which technology for transforming maize produce, extent to which strategies in marketing maize products enhance value chain in maize production, extent to which Natural Factors affect value chain in maize production. The study adopted descriptive survey design. The population of the study was 250 maize farmers from three villages in Garko Local Government Area of Kano State. The sample size was 154. 154 questionnaires with 30 items each were constructed based on the research questions formulated for the study. The questionnaire was designed using the five point lykert scale. Weights were assigned to each response as follows: 5 assigned to Strongly Agree (SA), 4 to Agree (A), 3 to Neutral (N), 2 to Disagree (D) and 1 to Strongly Disagree (SD). The data were analyzed using Ordered Logistic Regression method. The hypotheses were tested at 0.5 degrees level of significance. The findings revealed that activities in the maize value chain are production, harvesting, processing, and marketing, characterized by low productivity attributed to loss in soil fertility and traditional low-technology farming systems and it recommends that Supporting infrastructures and technologies should be developed by the government at all level to enhance the livelihood of farmers in maize value chain.

Keywords: *State policing, Federal police, National security, Deviants, Inevitable apparatus*

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Background to the Study

Value chain describes the full range of activities, which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers. Maize value chain consists of strategic components and activities involved in the movement of raw maize from growers through the processors to the final customers. At each stage of the chain value is added. Traders and intermediaries are the links between each stage in the chain. The smooth functioning of value delivery through value chain is facilitated by supply chain. Supply chain links both upstream and downstream activities. Upstream activities consist of supply side of the chain and downstream activities are marketing and distribution activities of the chain. It is also whole range of goods and services necessary for an agricultural product to move from the farm to the final customer or consumer. A major subset of value chain development work is concerned with ways of linking producers to companies, and hence into the value chains (Shepherd, 2014).

However, value chains can also be seen as a vehicle by which new forms of production, technologies, logistics, labor processes and organizational relations and networks are introduced. The main aim of a value chain is to produce value added products or services for a market, by transforming resources and by the use of infrastructures within the opportunities and constraints of its institutional environment. Stabel and Fjeldstad (1998) explained value chain analysis as a method for decomposing a firm or an industry or a commodity sector into strategically important activities and understanding their cost and value build-up. An industry or commodity sector may gain competitive advantage by performing these strategically important activities more cost-efficiently or better than its competitors. The distributional outcome in the value chains is to be seen in the incomes arising to capital (for its entrepreneurship, risk-taking and ownership of technology), labour (for its effort), and to the owners of natural resources (for their command over inputs which arise as gifts of nature) in each of the links in the value chain. value chain provides a direct line of entry into identifying the nature and extent of these barriers to entry along the chain. Important value chain activities in the maize value chain are growing, procurement, shipment to factories through intermediaries, production or processing of maize by using dry or wet milling operation, shipment of main and by products of maize to tertiary processing trough marketing intermediaries and marketing services.

Maize (Zea mays) is a member of the grass family (gramineace). Over 50 species of maize exist and consist of different colors, textures, grains, shapes and sizes. Yellow, white and red species are the most common types but most people prefer the yellow and white species (Ojo, 2000). It was introduced into Africa in more than 150 decades ago and has since become one of the dominant food crops in Africa. It originated from South and Central America and was introduced to West Africa by the Portuguese in the 10thcentury (FAO, 2013). Maize is among the major staple food crops in most sub-Saharan African countries. In Nigeria the major food staples are maize, rice, cassava etc. These are followed by wheat, millet, sorghum and potatoes. The smallholder subsector cultivates most of the land and produces most of the food crops. This subsector is characterized by small land holdings of 0.5–1.8 ha, (World Food

Programme and FEWSNET, 2007). Nigeria is the 10th largest producer of maize in the world and the largest producer in Africa (FAO, 2013). The region accounted for about 31% of the total national production in the years 2006 and 2007, 58% in 2008 and 44% in 2009 (Cadoni and Angeluci, 2013). In Nigeria, the estimated maize production in 2010 was put at about 8,800 metric tons with growth rate of 1.68%, in 2012, it rose to about 9,410 metric tons for which the growth rate was put at 1.73% (USDA,2012). Despite the economic importance of maize, many factors were identified to affect its production in Nigeria. Ojo (2000) opined that capitalization, price fluctuation, pests and diseases, poor storage facilities and inefficiency of resources utilization are some of the problems affecting maize production in Nigeria. One other major factor is climate especially rainfall. Climate limits the production area of maize and lack of rainfall (drought) or too much of it (flood) can result in 100% loss of maize output (Chi-chung and Mccarl, 2004). Similarly, it is projected that crop yield in Africa for many other crops may fall by 10-20% by 2020 due to climate change (Ajetumobi and Abiodun 2010; Ajetumobi, Abiodun and Hassan, 2010 and BNRCC, 2008). This is because African agriculture is predominantly rain-fed and therefore dependent on the vagaries of weather. Maize production has been characterized by low productivity attributed to loss in soil fertility, low application of inorganic fertilizers and traditional low-technology rain-fed farming systems (Tchale and Sauer, 2017). In response to the decline in smallholder agricultural production, the Nigerian government embarked on Farm Input Subsidy Programme (FISP) that targets maize farmers (Levy, 2005; Rubey,2004) which resulted in increased land productivity and increased maize production. The excess production of maize beyond household food requirements resulted in farmers selling some of the crop produce on the market. It is envisaged that increased sales of maize should have increased smallholder farm gate incomes an enhanced livelihood (Rubey, 2004).

Smallholder maize farmers in Nigeria are working to improve their livelihoods in an environment which is characterized by dwindling government support and increased competition among producers, processing companies and supermarkets within agricultural markets (KIT et al, 2006). Many development organizations believe that agriculture value chain development is a strategic means of bringing about market access and income to actors, especially the smallholder farmer. Functional value chain is said to be more efficient in bringing products to consumers and therefore all actors should benefit from the value chain development. Competitiveness in agribusiness in both local and international markets is noted to be one of the most commonly quoted objectives of value chain development. It is against this backdrop that over the year's successive governments in Nigeria have continued to encourage maize producers to increase output so as to meet both domestic and market demands; such government efforts include the establishment of National Research Institute (NCRI) project in 1970, National Seed Service (NSS) in 1975, Agricultural Development Projects in 1975. The result of government policies has made maize production increase over about six (0.6%) percent per annum (NFRA, 2008). The demand for maize in Nigeria has been on the increase from 1.34 metric tons in 1986-7.0metric tones in 2013, consumption growth rate at about eighty percent (80%) increase in total consumption by the end of the demand was meeting by domestic production while maize importation makes up the short fall. (FAO, 2006). However, little is known pertaining maize processing as most of the

processing in the study area was locally made using local tools, so the full potential of maize will not be harnessed by majority of the population and also undermined self sufficiency in food grain in the study area, (Mair and Marti 2008).

Similarly, due to low maize productivity, the government of Nigeria has embarked on a number of strategies aimed at improving staple food production in the country. In 2009, Nigeria introduced a Farm Input Subsidy Program as a pilot test with the aim to increase maize production and reduce import dependency. The program achieved an increase in maize productivity that persisted two years after the program (Center for Biodiversity 2017). The increased maize production may have resulted in increased maize sales within and across the states. The problem of declining maize yields is magnified by the fact that population continues to increase annually at a rate of about 4.3% leading to decreasing per capita consumption with a population density of 570 people per km2. Therefore, increasing maize productivity in Garko Local Government Area of Kano State is of urgent necessity and one of the fundamental ways of improving food security. Despite government's efforts to improve maize production through fertilizer subsidies and provision of agricultural extension services, maize production remains low in Garko Local Government Area of Kano State. This prompted the researcher to investigate value chain in maize production towards enhancing livelihood of rural farmers in Garko LGA, Kano State

Purpose of the Study

1. To establish the extent to which demographic characteristics of maize farmers affect value chain in maize production.
2. To ascertain the extent to which the activities involved in maize production enhance value chain in maize production.
3. To determine the extent to which technology for transforming maize produce affects value chain in maize production.
4. To determine the extent to which strategies in marketing maize products enhance value chain in maize production.
5. To identify the extent to which Natural Factors affect value chain in maize production.

Research Question

1. To what extent do demographic characteristics of maize farmers affect value chain in maize production?
2. To what extent do activities involved in maize production affect value chain in maize production?
3. To what extent does technology for transforming maize produce affect value chain in maize production?
4. To what extent do strategies in marketing maize products affect value chain in maize production?
5. To what extent do Natural Factors affect value chain in maize production in Niger

Hypotheses

H01: There is no significant relationship between demographic characteristics of maize farmers and value chain in maize production.

H02: Activities involved in maize production do not significantly affect value chain in maize production.

H03: There is no significant relationship between technology for transforming maize produce and value chain in maize production.

H04: There is no significant relationship between strategies in marketing maize products and value chain in maize production.

H05: Natural Factors do not significantly affect value chain in maize production.

Methodology

The study adopted descriptive survey design. The population of the study was 250 maize farmers from three villages in Garko Local Government Area of Kano State. The Yaro Yemani formula was used to determine the sample size as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = the sample size, N = population of the study, e = level of significance.
Therefore, $n = 250/(1 + 250(0.05)^2) = 154$

This is to ensure that every member of the population across the three villages had equal chance of being selected. 154 questionnaires with 30 items each were constructed base on the research questions formulated for the study. The questionnaire was designed using the five point likert scale. Weights were assigned to each response as follows: 5 is assigned to Strongly Agree (SA), 4 to Agree (A), 3 to Neutral (N), 2 to Disagree (D) and 1 to Strongly Disagree (SD). The data were analyzed using Ordered Logistic Regression method. The hypotheses were tested at 0.5 degrees level of significance.

In this study, maize production value chain (dependent variable), farmers' demographic characteristics, maize production activities, maize transforming technology, maize marketing strategies and natural factors, (independent variables) shall be used.

The functional relationship of the variables is:

$wpvc = f(wfdc, wmpa, wmtt, wmms, wnfa)$ 1

The econometric relationship of the model is:

$wpvc = \beta_0 + \beta_1 wfdc + \beta_2 wmpa + \beta_3 wmtt + \beta_4 wmms + \beta_5 wnfa + \mu$ 2

where: wpvc = weighted maize production value chain; wfdc = weighted farmers' demographic characteristics, wmpa = weighted maize production activities; wmtt = weighted maize transforming technology; wmms = weighted maize marketing strategies; wnfa = weighted natural factors. $\beta_1 \ldots \beta_5$ = Coefficients of the variables; β_0 = Constant term; μ = Error Term

Results

This chapter discussed in detail the analysis of the data collected from the respondents through the questionnaire.

Regression Test

Table 1: Ordered Logistic Regression Model

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Ordered logistic regression                     Number of obs   =        154
                                                LR chi2(5)      =     171.49
                                                Prob > chi2     =     0.0000
Log likelihood = -298.24503                     Pseudo R2       =     0.2233
------------------------------------------------------------------------------
        wpvc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        wfdc |  -2.565346   .6286236    -4.08   0.000    -3.797426   -1.333267
        wmpa |   .5193566   .5538524     0.94   0.348    -.5661742    1.604887
        wmtt |   3.769934   .7496132     5.03   0.000     2.300719    5.239149
        wmms |   .9347539   .4588972     2.04   0.042     .0353319    1.834176
        wnfa |   1.372374    .662965     2.07   0.038     .0729863    2.671761
-------------+----------------------------------------------------------------
```

Source: Computer Estimate

In Table 1, the result of the ordered logistic regression shows a Pseudo R-square value of 0.2233, meaning that about 22.33% of the variations in the dependent variable was jointly explained by the independent variables. The unexplained part of the dependent variable can be attributed to exclusion of very important independent variables that can explain the dependent variable but are outside the scope of this study.

The LR Chi2 value of 171.49 and its associated P-value of 0.0000 is an indication that the variables jointly is statistically significant at 5% level. This means that the regression model is valid and can be used for statistical inference.

WFDC (coefficient = -2.565346, p = 0.000) has a negative and significant relationship with value chain in maize production at 5% level. This means that 1-unit increase in the farmers' demographic characteristics (e.g age) will cause 2.57units reduction in value chain in maize production and vice versa.

WMPA (Coefficient = 0.5193566, p = 0.348) as an independent variable appears to have a positive but not significant influence on value chain in maize production. This positive coefficient shows that if activities involved in maize cultivation increase by 1unit, value chain in maize production will increase by 0.52unit, *ceteris paribus*.

WMTT (Coefficient = 3.769934, p = 0.000) has a positive and significant influence on value chain in maize production at 5% level. However, the positive coefficient is an indication that for every 1unit increase in the technique for transforming maize, value chain in maize production will increase by 3.77units, all things being equal.

WMMS (Coefficient = 0.9347539, p = 0.042) as an independent variable appears to have a direct and significant influence on value chain in maize production at 5% level. Coefficient of 0.9347539 means that if marketing strategies for maize produce increase by 1unit, value chain in maize production will increase by 0.93units, *ceteris paribus*.

WNFA (Coefficient = 1.372374, p = 0.038) as an independent variable appears to have a positive and significant influence on value chain in maize production. This positive coefficient of approximately 1.37 means that 1unit increase in natural factors will cause 1.37units increase in value chain in maize production. However, this relationship is not in line with the a priori expectation.

Result and Discussion of Findings

H01: There is no significant relationship between demographic characteristics of maize farmers and value chain in maize production.

Based on the results in Table 1, demographic characteristics of maize farmers was seen to be significantly related to value chain in maize production. As a result, the null hypothesis is rejected while the alternative hypothesis is accepted. Based on this premise, the work concludes that at 5% level, there is significant relationship between demographic characteristics of maize farmers and value chain in maize production. These findings concur with International Maize and Wheat Improvement Center (CIMMYT), (1993), Visser and Krosnick, (1998) that said young farmers are more likely to adopt a new technology because they have had more schooling and are more open to attitude change than older farmers. These results agree with Abebaw and Belay (2001), Rogers (2003) that says education is expected to enhance decision making and the adoption of agricultural technologies. Knowledge level influences adoption. Also (Alene et al., 2000), says that education was found to positively affect adoption of improved maize varieties. Maize value chain can be influenced by physical, socio-economic, and mental factors including agro-ecological conditions, age of farmer, family size, education of farmer, how-to-knowledge, source of information, and farmer's attitudes towards the technology (Rogers, 2003).

H02: Activities involved in maize production do not significantly affect value chain in maize production.

Table 1, shows that activities involved in maize production do not significantly relate to value chain in maize production. Hence, the null hypothesis is accepted. The work concludes that activities involved in maize production do not significantly affect value chain in maize production at 5% level. These findings are in line with FSRP/ACF and MACO, (2011) that says minimum tillage lowers the cost of production, as is labor saving and enhances

productivity. The United Nations Industrial Development Organization (2009) describes a value chain as the entire range of activities that are undertaken to bring a product from the initial input-supply stage, through the various phases of processing, to its final market destination, including its disposal after use. For instance, agro-food value chains encompass activities that take place at the farm or rural level, including input supply, and continue through handling, processing, storage, packaging and distribution. As products move successively through the various stages, transactions take place between multiple chain stakeholders, money changes hands, information is exchanged and value is progressively added. Hence a value chain is a system of interdependent activities.

H03: There is no significant relationship between technologies for transforming maize produce and value chain in maize production.

Table 1, shows that technologies for transforming maize produce significantly relate to value chain in maize production. Hence, the null hypothesis is rejected in favour of the alternative hypothesis. The work therefore concludes that at 5% level, there is significant relationship between technology for transforming maize produce and value chain in maize production. Processing of maize is an important activity in the maize value chain. It contributes more value to the chain, and consequently more income is received by the factors of production at each stage. According to Moser and Barrett (2003), Minten and Barrett, 2008; improved technology adoption for agricultural transformation and poverty reduction is critical in modern day agriculture. Technical change in the form of adoption of improved agricultural production technologies have been reported to have positive impacts on agricultural productivity growth in the developing world (Nin et al, 2003). Promotion of technical change through the generation of agricultural technologies by research and their dissemination to end users plays a critical role in boosting agricultural productivity in developing countries (Mapila, 2011).

H04: There is no significant relationship between strategies in marketing maize products and value chain in maize production.

Table 1, shows that strategies in marketing maize products significantly relate to value chain in maize production. Hence, the null hypothesis is rejected in favour of the alternative hypothesis. The work concludes that at 5% level, there is significant relationship between strategies in marketing maize products and value chain in maize production. Markets in recent times are changing fast and competition is becoming increasingly stiffer. If businesses aspire to stay in the market, they need to make sure that their products and services meet continuously changing market requirements (Matthias and Muzira, 2009). In Shepherd's (2006 cited in Sualihu, 2012) study, lack of capacity building and financial credit prevented smallholder farmers in Kenya from participating in global value chains because they lacked the means by which to certify their produce as required by the European markets. There is generally a lack of market orientation among maize producers and processors. Recent global policies propose that smallholder farmers can get out of poverty by being better linked to markets. Therefore, constraints for value chain development are related to market access (local, regional, international) and market orientation (Grunert et al. 2005).

H05: Natural Factors do not significantly affect value chain in maize production.

Table 1, shows that Natural Factors significantly relate to value chain in maize production. Hence, the null hypothesis is accepted. The work concludes that at 5% level, Natural Factors significantly affect value chain in maize production. Ojo (2000) opined that capitalization, price fluctuation, pests and diseases, poor storage facilities and inefficiency of resources utilization are some of the problems affecting maize production in Nigeria. One other major factor is climate especially rainfall. Climate limits the production area of maize and lack of rainfall (drought) or too much of it (flood) can result in 100% loss of maize output (Chi-chung and Mccarl, 2004).

Recommendations

This article did set out to analyze value chain in maize production towards enhancing livelihood of rural farmers in Garko LGA, Kano State**.** The overall performance of value chains and improvement in the livelihood of smallholder farmers would improve if appropriate interventions are made to improve the development of maize production.

1. Creating the right environment for agriculture and investing in rural public goods. An enabling environment implies peace and public order, macro-economic stability, inflation under control;
2. Governments have a responsibility to provide essential goods and services, infrastructure, such as rural roads, and agricultural research and extension.
3. Measures to improve maize value chains require collaboration between state and the federal government
4. Governments and international agencies need to boost efforts to minimize effects of droughts, floods on maize production

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