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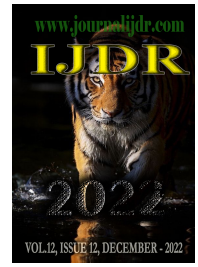
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RESEARCH ARTICLE

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CHALLENGES OF MILLET AND SORGHUM VALUE CHAIN ACTORS IN JIGAWA STATE, NIGERIA

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ABSTRACT

The study examined the socioeconomic characteristics and challenges faced by millet and sorghum value chain actors in Jigawa State Nigeria. Two LGAs were randomly selected from each of the three senatorial zones in the state and 300 structured questionnaires were administered, 50 per LGA. There were different set of questionnaire for each of the four value chain actors comprising input dealers (60), producers (120), processors (60) and marketers (60). Key Informant Interview (KII) and Focus Group Discussion (FGD) were also employed to generate additional information from the respondents. Simple descriptive statistics was used for the analysis using Eviews 9. The study discovered that lack of capital was the main challenge across the four value chains. Other problems identified included lack of training, unstable price, lack of fertilizer, drought, lack of equipment and bad debt. To overcome these challenges the study recommends adequate information on how to access bank loan and management training should be provided to the actors, fertilizer should be made available at official rate, irrigation and water resources should be developed to minimize the impact of drought, and linkages with industries to minimize excessive price fluctuations.

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INTRODUCTION

Nigeria is one of the major producers of millet and sorghum in Africa though all West African countries produce millet and sorghum. Specifically, Nigeria is the largest producer of sorghum in the world with a production of nearly 7 million metric tons (Mt) recorded in 2012 (Bethesda, Austin et al. 2014). Millet and sorghum have great potential for economic growth, income generation, and potential source of job creation. More than 200 million farm households make their living from millet and sorghum. ECOWAS recognizes millet and sorghum as the core strategic commodities in the sub-region for food security. Both their grains and stalks provide multiple food products used as raw materials for malt beverages, alcoholic beverages, malt extracts, and confectionary, other food items and animal feed. Sorghum is used basically in traditional, industrial and for animal feed whereas millet is essentially used for human consumption (Bethesda, Austin et al. 2014). FAO (2016) Commodity Balance sheets in Eastern and Southern Africa show that 91% of sorghum and 89% of millets are used as food, with the balance used as seed, animal feed, and waste.

'Non-food' uses are therefore minimal. Of the total used for food, about 10% of sorghum and 23 % of millets are 'processed' into food by the formal sector, and the rest consumed on-farm (Mitaru, Mgonja et al. 2012, Orr, Gierend et al. 2017). According to the FAO (2016), only approximately 10 percent of the world's sorghum is produced for export. Of the world's largest sorghum producers, the United States and Argentina are the primary exporters; together, they control 70 percent of the global export market (Eckert and Latané 2017). Sorghum and millets have been seen as victims of a 'subsistence production trap' in Eastern and Southern Africa (Rohrbach and Kiriwaggulu 2001). Millet and sorghum are subsistence crops grown mainly under rain-fed agriculture by traditional Sahelian farmers and their cultivation is labor-intensive and most operations are done manually, using traditional agriculture practices, including some intercropping. The majority of farmers sell soon after the harvest, when the crops prices are the lowest. Storage systems are traditional, with limited aeration and often not following technical recommendations for fumigation. This is due in part to a wide variety of norms and standards for storage within the region (Orr, Gierend et al. 2017).

Millet and sorghum production is dominated by small-scale producers (more than 90% of the farmers in West Africa cultivate these crops). Their farms sizes are less than 3 ha. Commercial millet and sorghum farmers are considered those who are cultivating more than 3 ha. Millet and sorghum farmers in West Africa typically follow low-input, low-output production systems, characterized by limited access to agricultural credit, inefficient use of fertilizers, and no access to high-yielding improved seeds. Farm yields are typically 1-1.5 Mt/ha and Post-harvest losses can be 35-50% (Bethesda, Austin et al. 2014). Numerous studies have identified multiple problems affecting the millet and sorghum sector in sub-Saharan Africa. Orr, Gierend et al. (2017) observed that on the supply side, the lack of a commercial market for these crops discourages investment in new technology to increase yields. On the demand side, the development of a commercial market is discouraged by low yields and the lack of a consistent marketable surplus. The result is a low-level equilibrium trap for both sellers and buyers. To address cash needs, farmers sell even in years where there is no surplus. Farmers are forced to sell at harvest to pay-off their debts or family obligations (Kaminski, Elbehri et al. 2013). With subsistence agriculture practiced by majority of small holder farmers in Africa, yield gaps are high and poor soils, amongst other constraints add to the difficulties for sustainable farming and incomes. Millet and sorghum productivity has not kept pace with the increasing demand in Africa due to both a lag in crop improvement and extreme environmental conditions and the low input agriculture under which these crops are grown (Macauley and Ramadji 2015). UNDP (2013) identified some of the key challenges of agriculture in Nigeria to include the scale of farming, little knowledge and capacity of production and marketing, and poor infrastructure and access to finance. On the processing side there are little outlets that want to invest back in the value chain due to lack of finance as well as little comparable advantages (i.e. high cost and low quality) of local produce. Scattered value chains and weak value chain linkages between lead firms, processors and farmers are undermining the growth of value chains. This study examined the challenges of the actors in the millet and sorghum value chain in Jigawa state, Nigeria. The data was collected using structured questionnaire and simple descriptive statistics was employed in the analysis. The rest of the paper comprises of the following sections: Section two presents the literature review, section three contains the methodology, section four comprises the presentation and discussion and section five concludes the paper alongside some policy recommendations.

Literature Review

Bethesda, Austin et al. (2014) identified access to finance as the key problem for most of the actors in the millet and sorghum value chain. Other constraints include limited access to fertilizer, lower yields due to inappropriate practices (use of seeds, fertilizers and post-harvest losses), high costs of inputs mainly agrochemicals and mechanization of crop production, inadequate market infrastructure, inadequacies of advisory and extension services and limited market information without a comprehensive regional MIS in place. In its findings on the main constraints affecting commodity value chain in Borno state, Nigeria, House (2018) listed inadequate infrastructure, lack of farm equipment, inadequate market information (asymmetric information across the value chains) and inadequate access to financing mechanisms. Rooney (2003) observed that in Senegal the major limitation in the production of millet and sorghum is the lack of high quality grain in sufficient quantities for processing. Macauley and Ramadji (2015) identified some of the toughest environmental challenges that affect the cultivation of millet and sorghum in Africa to include inherent problems associated with dry land agriculture (low and irregular rainfall, high temperatures, poor soils and inappropriate agronomic practices), climate change and land degradation, rapid population growth, and poverty amongst the farmers. The main challenges hindering wide scale production and marketing of pearl millet along the chain in Tanzania include: poor production systems, weak management practices, inadequate equipment availability, low developed marketing channels, lack of base price for pearl millet, poor grain storage facilities and poor infrastructures (Gulia et al.,

2007; Janick and Whipkey, 2007) cited in (Charles 2013). Others include uncertain demand, non-availability of grain, thin markets and poor grain quality (Rohrbach and Kiriwaggulu, 2007). Charles (2013) investigated constraints in pearl millet marketing in Tanzania: the value chain approach. He used descriptive and regression analysis. He discovered that the millet farmers have low access to education and market information, low mechanization and technology, low price, low demand for the product and shortage of capital, drought and lack of market. Kaminski, Elbehri et al. (2013) observed that the persistent low yields of sorghum and millet in Mali were primarily due to the lack of input use and the continued practice of traditional and minimum input production techniques. Producers face difficulties in accessing inputs due to liquidity constraints and a lack of accessible credit because of low yields, high weather and market risks and high variability in surplus production. Mitaru, Mgonja et al. (2012) mentioned the constraints that constitute the major limitations in the millet and sorghum sector in East and Central Africa to include low productivity, high post-harvest handling losses, limited processing and utilization, limited marketing, unfavorable government policies, limited capacity building and institutional development efforts; and limited knowledge and information exchange. Eckert and Latané (2017) describe four common barriers to smallholder farmers' ability to compete in an agricultural value chain: lack of access to markets, lack of or skills and/or training, lack of collaborative networks, and lack of finance. These barriers were often compounded by weak regulatory institutions, poor infrastructure, and a lack of upstream and downstream value chain actors that provide important supplies and services for upgrading. Hamukwala, Tembo et al. (2010) identified limited access to input markets, extension services, lack of desired varieties and processing technologies as some of the challenges that millet and sorghum farming households faced in Zambia. In addition, despite the new markets for sorghum in the brewery industry, farmers still view marketing as a challenge. Pabuayon and Medina (2007) and (Charles 2013) argued that linking farmers to markets and supporting value adding activities can raise their income and thus provide incentives for improving their management practices toward greater farm productivity. The value chain approach ensures that rather than one problem, a whole range of inter-connected problems from production to consumption is addressed. This includes identifying critical constraints to improved market performance, alleviation of constraints, smallholder commercialization and its contribution to growth level of market participation, policy choices and identification of innovative ways to link public funding with private sector resources.

METHODOLOGY

The millet and sorghum value chain considered in this study comprises small holdings input dealers, producers, processors and marketers. The steps taken in the methodology included mapping the activities and processes in the value chain (per level) for sorghum and millet production. Determining the key value chain actors and stakeholders, and then identifying the sample sizes and the targeted respondents in each of the locations. The data was collected through four types of structured questionnaires (each for a particular value chain), Key Informant Interview (KII) and Focus Group Discussion (FGD). The data was analyzed using tables and simple descriptive statistics using Excel and Eviews 9. The population comprises of all the Millet and Sorghum farmers in Jigawa State in its 27 LGAs. Two LGAs were randomly selected each from the three senatorial zones in the state. Thus six LGAs were used in the study comprising Kiyawa, Jahun, Kaugama, Kafin Hausa, Garki and Gumel respectively.

Discussion and Presentation: The result indicates that the value chain of sorghum and millet production is predominantly dominated by men in Jigawa state with the exception of processors. The data showed that about 90% of the input dealers, 99% of the producers and 100% of the marketers were men. This value chain is clearly a male dominated activity. Perhaps, this could be attributed to heavy capital requirement, traveling to obtain the goods and interacting with

Table 4.1 Level of Education of the Respondents

	Input Dealers	Producers	Processors	Marketers
Level of Education	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Primary School	26.7	10.8	10.0	16.7
Secondary School	25.0	20.8	30.0	26.7
Tertiary Education	40.0	49.2	23.3	23.3
Non-Formal Education	8.3	19.2	36.7	33.3
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 4.2 Primary occupation

	Input Dealers	Producers	Processors	Marketers
Valid	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Yes	43.3	36.7	60	56.7
No	56.7	63.3	40	43.3
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 4.3 Membership of Association/Cooperative

	Input Dealers	Producers	Processors	Marketers
Membership	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Yes	36.7	41.7	23.3	40
No	63.3	58.3	76.7	60
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 4.4 Benefits of Membership of Associations

	Input Dealers	Producers	Processors	Marketers
Benefits	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Access to Credit	40.0	26.7	40.0	46.7
Access to fertilizer	16.7	36.7	16.7	10.0
Access to Other Farm Inputs	25.0	15.0	20.0	20.0
Access to Training	16.7	12.5	13.3	20.0
Others	1.7	9.2	10.0	3.3
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 4.5 Source of Capital

	Input Dealers	Producers	Processors	Marketers
Source of Capital	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Personal Savings	68.3	71.7	70.0	73.3
Family and Friends	23.3	10.8	20.0	10.0
Cooperative Societies	5.0	8.3	6.7	6.7
Government	-	5.8	3.3	3.3
Microfinance/Commercial Banks	3.3	2.5	-	3.3
Politicians	-	.8	-	3.3
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 4.6 Accessing Bank loan

	Input Dealers	Producers	Processors	Marketers
Membership	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Yes	11.7	21.7	13.3	26.7
No	88.3	78.3	86.7	73.3
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 4.7 Reason for not Accessing Bank Loan

	Input Dealers	Producers	Processors	Marketers
Reason	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Lack of Information	8.3	20.8	43.3	43.3
No Bank in the Town	40.0	30.0	33.3	26.7
Religious Reasons	13.3	28.3	16.7	16.7
Lack of Collateral	38.3	18.3	3.3	10.0
Others	-	2.5	3.3	3.3
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 4.8 Access to Credit

	Input Dealers	Producers	Processors	Marketers
Access to Credit	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Yes	24.1	39.2	16.7	30.0
No	75.9	60.8	83.3	70.0
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 4.9 Source of Credit/Loan

	Input Dealers	Producers	Processors	Marketers
Source of Capital	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Personal Savings	33.3	41.7	70.0	43.3
Family and Friends	23.3	26.7	20.0	23.3
Cooperative Societies	16.7	11.7	6.7	13.3
Government	3.3	5.8	3.3	3.3
Microfinance/Commercial Banks	18.3	11.7	-	13.3
Others	5.0	2.5	-	3.3
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 10 Acceptance of Bank Loan

	Input Dealers	Producers	Processors	Marketers
Acceptance of Bank loan	Valid Percent	Valid Percent	Valid Percent	Valid Percent
Yes	68.3	64.2	56.7	80.0
No	31.7	35.8	43.3	20.0
Total	100.0	100.0	100.0	100.0

Source: Computed by authors

Table 11. Challenges and Remedies identified by Value Chain Actors

Value Chain Actor	Main Challenge	How to overcome Challenge
Input dealers	<ul style="list-style-type: none"> ▪ Lack of capital (45%) ▪ Lack of training (40%) ▪ Unstable price (10%) ▪ Bad roads (5%) 	<ul style="list-style-type: none"> ▪ State/bankloan
Producers	<ul style="list-style-type: none"> ▪ Lack of capital (56%) ▪ Lack of fertilizer (21%) ▪ Drought (13%) ▪ Lack of training (7%) ▪ Unstable price (3%) 	<ul style="list-style-type: none"> ▪ State/bank loan ▪ Provision of fertilizer at government controlled rate ▪ Construction of dams to tackle drought ▪ Training ▪ Price control
Processors	<ul style="list-style-type: none"> ▪ Lack of capital (63%) ▪ Debt defaulters (17%) ▪ Lack of equipment (17%) ▪ Unstable price (13%) 	<ul style="list-style-type: none"> ▪ State/Bank loan ▪ Management training ▪ provision of modern processing equipment ▪ price control
Marketers	<ul style="list-style-type: none"> ▪ Lack of capital (68%) ▪ Unstable price (13%) ▪ Bad debt (10%) 	<ul style="list-style-type: none"> ▪ State/bank loan ▪ Price control ▪ Management Training

Source: Compiled by authors

predominantly male customers. Most of rural women are poor in Northern Nigeria, and interacting with males is discouraged for religious and cultural reasons. But the processing value chain had the heaviest presence of women of up to 53%. Most of the processing was food items that were prepared within the house. Possibly that's why women are comfortable to participate more in this value chain because it doesn't require going out and mixing with men. As indicated in Table 4.1 most of the Input dealers (40%) and producers (49%) had tertiary education. Clearly, the actors in this value had the highest level of education and by extension awareness. On the flip side, though substantial percentage of the processors (37%) and marketers (33.3%) had non-formal education but about 23% had completed tertiary education. It could therefore be reasonably asserted that most of the respondents were educated enough to learn modern ways of doing business along these input value chains. As presented in Table 4.2, amongst all the respondents only processors (60%) and

marketers (56.7%) had more than half of them considering the activity in that value chain as their main preoccupation. This implies that most of the input dealers and producers of millet and sorghum in the study area are only engaged during the farming season. During off-season, obviously dry season, they are engaged in other non-farm activities. It's clear from Table 4.3 that most of the respondents do not belong to any associations or cooperatives. Producers and marketers were the value chain that had the highest number of memberships with 41.7 per cent and 40 per cent respectively. Cooperative societies provides an added advantage for small businesses to access bank loan or other incentives from the government much better than operating as an individual business. Therefore, this could possibly pose a setback for the four value chain actors. Table 4.4 shows that most of the respondents with the exception of producers, identified access to credit as the main benefit of the membership of associations.

Precisely, 40 per cent of input dealers and processors, and about 47 per cent of marketers were of this opinion. However, about 37 per cent of the producers opted for access to fertilizer as the key benefit. This is not unusual as the fertilizer is the most pressing need of producers of millet and sorghum in the study area. Other benefits identified were access to other farm inputs and access to training. This clearly suggests that there were a number of benefits associated with the membership of associations or cooperative societies. The main source of capital for almost 70 per cent of the respondents was personal savings and then through families and friends as indicated in Table 4.5. About 68 per cent of input dealers, 70 per cent of processors and more than 70 per cent of both producers and marketers obtain their capitals from personal savings. Only very few of the respondents were able to get their capital through other means like cooperatives, government, microfinance/commercial banks and through politicians. The result showed that less 10 per cent of the four value chain actors sourced capital through bank loans. This indicates a great paucity of access to finance amongst the value chain actors of millet and sorghum in Jigawa state. as such this could be a hindrance to their productive capacity and sustenance of the business. Table 4.6 shows that a substantial majority of the four value chain actors input dealers (88%), producers (78%), processors (87%) and marketers (73%) of millet and sorghum in Jigawa state had never accessed bank loan for their businesses. This corroborates the finding that majority of the respondents use personal savings for their businesses. It could therefore, limit their capacity to expand their businesses and rip the benefit of large scale production and profits. As depicted in Table 4.7 majority of the input dealers (40%) and producers (30%) could not access bank loan for lack of banks in their respective towns whereas 43.3 per cent of both processors and marketers could not access it due to the lack of information on how to access loan. Other important reasons given by quite a number of the millet and sorghum value chain actors include religious reasons and lack of collateral. All the respondents were Muslims and Islam forbids interest on loans, therefore this could be the reason why it's discouraging the respondents from utilizing banking facilities. It could be inferred from the foregoing, that most of the respondents have problem of accessing bank loans due to mainly lack of banks in the area and the knowledge of how to access it easily. It's clear from the result that the majority of the respondents don't have access to credit or loan to finance their business as shown in Table 4.8. About 76 per cent of the input dealers, 61 per cent of the producers, 83 per cent of the processors and 70 per cent of the marketers do not have access to credit. This will likely pose a big challenge for sustaining and expanding their businesses. The result in Table 4.9 shows that the majority of the respondents sourced their business capital from personal savings and then through families and friends. About 57 per cent of input actors, 68 per cent of producers, 90 per cent of processors and 67 per cent of marketers got their capital from these two sources. Only about 18 per cent of input dealers, 12 per cent of producers and 13 per cent of marketers were able to obtain bank loans. None of the processors was able to obtain a bank loan as they were mostly low educated women. This shows a great inadequacy of capital amongst the millet and sorghum input value chain actors in the study area. Most of the respondents 68 per cent of input dealers, 64 per cent of producers, 57 per cent of processors and 80 per cent of marketers were willing to accept bank loan if offered. From Table 11 it appears that lack of capital is the key challenge affecting the four value chain actors of millet and sorghum in Jigawa State. With the exception of input dealers (45%), majority of producers (56%), processors (63%) and marketers (68%) identified lack of capital as the main challenge affecting their businesses respectively.

CONCLUSION

The study investigated the main challenges faced by the value chain actors of millet and sorghum production in Jigawa State, Nigeria. From the results it's clear that lack of capital is the most pressing problem faced by the input dealers, producers, processors and marketers of millet and sorghum in the study area. In addition, lack of fertilizer and drought were part of the problems affecting producers.

Lack of equipment troubled processors in particular whereas other problems associated with both processors and marketers include bad debts and unstable prices. To address the pressing need for capital/finance the study recommends the Government to establish a revolving loan and hire purchase schemes amongst the actors through their cooperatives. The cooperatives should also be used to link them up with microfinance and deposit money banks for ease of facilitating bank facilities. Were needs be the Government should act as grantor for such loans. However, the development of pearl millet sub-sector should not be left in the hands of Government alone; other stakeholders such as private investors and agro-allied industries should be encouraged to invest in the sector. In addition, research institutions should key-in in the development of technology that will improve the production, processing, packaging, storage, marketing, accessibility of marketing opportunities of millet and sorghum within and outside the country using mobile Apps technology amongst others. It is also recommended that fertilizer should be made available and affordable to the producers and in good time before the commencement of raining season. In Nigeria politicians are fond of exploiting the hope of farmers by making awkward promises of supplying sufficient fertilizer at subsidized rate, which is often easier said than done. Therefore, this habit should be stopped and a more sustainable way should be harnessed through the private sector such as fertilizer industries and concession to importers. To address the issue of drought this requires imploring science and technology to make use of the water resources in the country for irrigation as well as developing drought resistant seeds of millet and sorghum in the country. This should also be applicable in the provision and development of equipment for processing and usage by other value chain actors. There should be a continuous strategic plan by the Government to ensure a steady growth and development of the subsector. This should include linkage with industries to stabilize price to enable the value chain actors to plan effectively and maximize profit.

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