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Cross border trade analysis of the rice value chain between Uganda and South Sudan: an insight from Elegu and Nimule border posts

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ABSTRACT

Rice is an important agricultural commodity in Uganda's economy serving both as cash and food crop and is produced in almost all regions of Uganda. As a cash crop, considerable trade in this commodity occurs within and across the borders of Uganda and South Sudan. Therefore, this study was aimed at conducting a cross border trade value chain analysis between Uganda and South Sudan. Specifically, the rice value chain was analyzed and the determinants of cross border trade were ascertained. Data was analyzed using descriptive statistics and probit regression analysis to determine factors influence cross border trade in rice between Northern Uganda and South Sudan. Results revealed that three quarter of traders were of Ugandans Nationals with significant level ($p<0.001$). Econometric model results showed that the source of rice, the nationality of the actor, and business experience (years) and occupation significantly influenced cross border trade. Ugandan traders were involved in trade more than non-Ugandans because of access to locally produced rice. Gender based performance on rice trade was significant ($p<0.002$) for both Ugandans and non-Ugandans with males participating in trade more than the females. Most of the wholesale buyers were from Kampala; they buy rice in large volumes while the rest of the rice is bought by exporters, local wholesalers and retailers. Our study recommends that rice value addition and upgrading should be promoted to in order to increase incomes and competitiveness of cross-border trade.

PUBLIC INTEREST STATEMENT

Rice is an ideal crop that is produced and consumed globally. It is important for both food and income and is produced by several smallholder farmers. This has been attributed to favorable policies, the development of improved seeds and the high prices in the domestic markets coupled with increased domestic and international demand for rice. Cross-border trade thus becomes very important in bridging the demand and production gap. This study maps cross border trade of the rice between Uganda and South Sudan with objectives of determining the factors influencing rice trade a cross the border. Despite increased domestic rice production in Uganda, the increased demanded has not been met yet. For instance, South Sudan is still a net importer and high consumer in the region with minimal levels of domestic production. In northern Uganda, rice exported to South Sudan constitutes both locally produced rice and re-exports.

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1. Introduction

Rice is a staple food for approximately half of the world's population and fourth most produced agricultural crop world-wide, after sugar cane, maize and wheat (Irshad et al., 2018). Due to the mismatch in rice production and consumption across countries, both formal and informal Cross Border trade (CBT) in rice are important (Ogalo, 2010). Evident from East African Community (EAC) particular Sudan and Uganda for instance as partner states have a rich history of cross border trade with a significant proportion conducted in the formal borders between two (UNFAO, 2018a). By using formal borders, rice traders can be provided with better services, such as access to finance, technical and market information using state-of-the-art technology. Border officials can

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also perform their duties more effectively, and expect an improvement in revenue collections (Tull, 2017). Despite the importance of rice in South Sudan, production is low, while introduced varieties do not meet the standards of imported rice in physical, cooking and eating qualities (Mogga et al., 2019). Therefore, these varieties do not offer competitive prices in the market. A major challenge in the rice sector in South Sudan is, therefore, how to produce sufficient and affordable high quality rice that not only meets the preferences of its fast-growing and increasingly urbanized population, but also competes favorably with imported rice (Mogga et al., 2019).

Total trade with the rest of the world has been on an upward trend and has registered a growth rate of 6.5 percent worth about USD 55,906.4 million in 2014 from USD 52,502 million in 2013. This trade was driven by increased levels of both imports and exports. In 2014, the EAC countries recorded a trade deficit of USD 23,688 million compared to a trade deficit of USD 22,559 million in 2013 (UBOS, 2015). However, the value of intra-EAC trade is reported to have decreased to USD 5,633 million in 2014 from USD 5805.6 million recorded in 2013. The composition of intra-EAC trade for over the years is mostly agricultural commodities and manufactured goods (UBOS, 2015). Rice forms an important component of this trade, in the EAC for instance, the total rice consumption is over 1.8 Million Metric Tons (MT) annually with an average rate of four percent growth rate. Consequently, the region imported over 0.6 Million MT per annum of rice worth USD 500 Million a deficit supplied with import from Asians countries (Nzomoi & Anderson, 2013). In exports, official figures indicate that 27,000 – 37,000 MT of rice are formally traded across the border within EAC region and another 17,000 – 25,000 MT exported outside the regional border worth USD 35,200 – 49,600 million annually (Leopold Ghins et al., 2019). This constitutes about 3.5% of the total agricultural trade in the region (Leopold Ghins et al., 2019). There exists a vast difference in import use between Uganda and South Sudan. In South Sudan, virtually all imports are for domestic consumption, but 50 percent of Uganda's imports are for re-export since the country acts as a key transit corridor for shipping relatively cheap Pakistani or Vietnamese imports onwards to Uganda and South Sudan (Nzomoi & Anderson, 2013).

There is a lot of potential for import substitution opportunities in the rice sector in Uganda as is evident in the volume of imports flowing into the country annually. Total rice consumption is estimated at 169,000 MT annually. Consumption per capita is about 6–8 Kg. Total production is estimated at 106,700 MT (milled rice) annually leaving a deficit of 60,000 MT which is catered for by importation (MAAIF, 2018). With a population growth rate of 3.2% indicating that rice consumption is likely to increase every year (MAAIF, 2018). Uganda's rice import bills amounting to over USD 30 million annually is sufficient to support at least 10,000 acres of production (Ayoki, 2017). Uganda's export sector is still in many ways undeveloped and vulnerable given that over 80 percent of the imports are re-exports. The fact that the bulk of rice exports originate from imports makes trade in rice particularly subject to changes in government policies in both the exporting countries and Uganda (Ayoki, 2017). Data related challenges still compound the adequacy of recording of rice trading activities in national accounting systems and statistical databases to improve local production (UNFAO, 2017). All the economic transactions taking place at the borders are not systematically documented in terms of data and statistics, making it difficult to capture and understand the different dynamics at play to inform trade policies and processes (UNFAO, 2017). Uganda has an annual supply deficit in rice but at the same time it is a significant exporter of rice in the region. This creates a puzzle that needs to be unraveled.

Between Uganda and South Sudan, there has been an increase in rice CBT which has taken several forms such as formal and informal trade across the border due to proximity of the border posts, a factor that eases trading in different types of agricultural commodities. With the increased rice production especially in northern Uganda, and also the increased rice imports to Uganda, mapping the rice value chain at the Uganda-South Sudan border becomes paramount in understanding the dynamics involved in rice CBT. South Sudan has little contribution in the sector of food consumption of rice economies, given that only Awiel rice scheme in Northern Bahr el Ghazal state, Renk rice scheme in Upper Nile state and Yei river rice schemes in Central Equatoria state runs by government with insufficient number of smallholder rice farmers involved in the production along rice value chain (UNFAO, 2018a) given the fact that little research has been conducted in this field, It is believes that 76 percent of rice consumed locally is imported from international market. As we looked at more research publication, there insignificant evident for South Sudan a member of East African

Community who recently joined rice production is low with other east African countries having an emerging potential of rice production (Léopold Ghins & Pauw, 2018).

This study was set-up to map the current rice value chain and assess the drivers of participation in rice CBT with the aim of understanding the dynamics of rice value chain in the Uganda-South Sudan border. This is important given the scenarios which require improving rice productivity by addressing production and trade related constraints such as quality along the value chain. This is to make sure that it is imperative for Uganda and South Sudan to take steps to strengthen and improved local production and reduce dependency on importation from global suppliers. This study analyzes the rice value chain with the aim of prioritizing the local rice production, marketing and ultimately improving the local rice consumption as well as ascertaining the factors that influence cross border trade between the two neighboring countries.

The rest of the manuscript is organized into the following sections: section two provides the materials and methods, analysis involved what configuration factors in the rice value chain in Northern Uganda and South Sudan and the probit regression model determine factors influence cross border rice trade, section three presents the results and discussions. The last part of the manuscript ends with concluding remarks and policy recommendations.

2. Materials and methods

2.1 Study area

The study was conducted at the border posts of Uganda and South Sudan: Elegu and Nimule border respectively. This was because the two border posts have the highest export and import volumes of agriculture commodities passing to South Sudan and Uganda. Two districts, Amuru and Gulu were purposely selected because they have some cross-border traders (Figure 1) and for the purposes of mapping the rice value chains. Amuru district was selected given that it borders South Sudan, but is also among the districts with the second largest rice production in northern Uganda. Gulu district was selected given that it is the largest Urban centre, nearest to Elegu border. Elegu border is found in northern part of Uganda in Amuru district, Kilak North Constituency. Amuru district is well known for its fertile land with various types of crops such as maize, sorghum, bean and rice (MAAIF, 2018).

2.2 Research approach and Sample design

A purposive sampling method was employed to select two districts and one town council of South Sudan. Two districts Gulu and Amuru and one town council-Nimule Town council were selected for the study. This was because the two border points are predominant in export and import volumes of

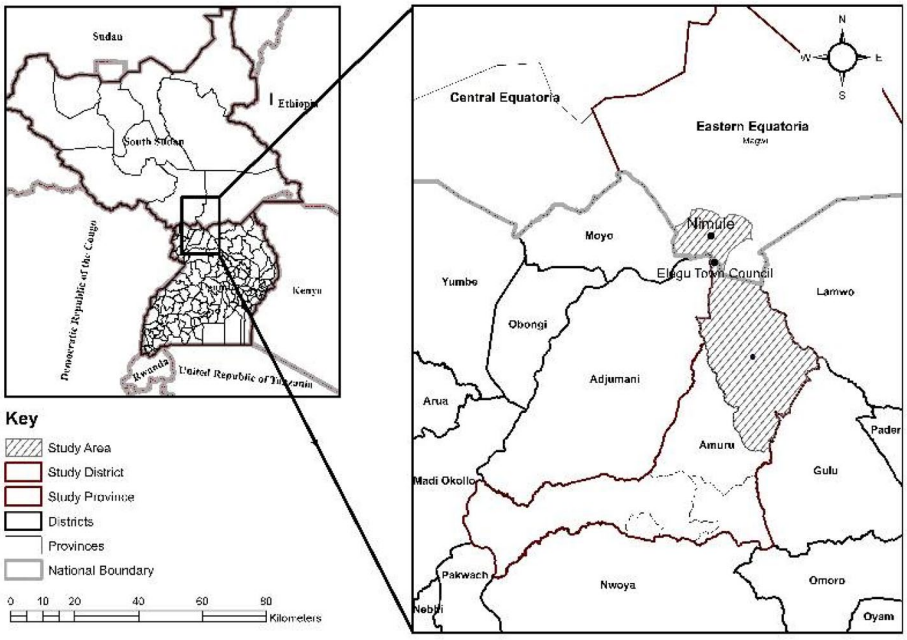

Figure 1. Map of the study area generated from ArcGIS.

agriculture commodities between South Sudan and Uganda. These formed the basis for mapping the rice value chain across the two border points. The sample size was determined using the table of Morgan & Krejcie Table of the sample size with Population (N) 210 estimated respondents in the analysis of cross border rice value chain between Northern [1]Uganda and South Sudan making an estimated Sample Size (S) read from the table of 136 respondents.

In this rice cross-border trade at Elegu border point, there were both formal and informal trade. As such, there was no available list of traders that could be accessed for this research. The study thus, adopted a respondent driven sampling approach in identifying study participants. This sampling technique was used because members of these populations have not been previously identified (Woodley & Lockard, 2016). By identifying the first subject, it was possible to get referrals to other traders whose consent was sought before including them in the study. Table 1 shows the selection method used to obtain the traders. Traders were asked to identify their fellow traders who were then selected for the survey in Elegu and Nimule town. A total of 136 respondents were interviewed.

2.3 Data collection

Primary data were obtained using semi-structured questionnaires administered to the different respondent categories. Specific questionnaires were designed for key respondent categories including 41 processors, 16 exporters/importers, and 79 wholesalers and retailers. The questionnaire captured critical information on dimensions connected to rice traders' marketing activities. Questions were asked on the frequency, profile and forms of participation in rice trade, type and quantity of rice products traded, capital requirements, means of transportation across borders, access to information, awareness of trade requirements and provisions, challenges and opportunities in cross-border trading activities as well as demographic characteristics.

Table 1. Number of respondents of cross border rice trade.

District	Number of Respondents	Centres & Towns
Gulu town	16	Gulu market millers
Amuru district	91	Pabbo millers, Atiak/Bibilia and Elegu Market, custom, and truck centers
Nimule town	29	Malakia market, custom, truck centers and migration

Source: field survey (Jan 2020).

2.4 Methods of analysis

The collected data were analyzed using STATA software version 14.0 and was subjected to descriptive and econometric methods of analysis. Descriptive approaches involved preparation of a chain map and other descriptive statistics including frequencies, percentage, mean and standard deviation. Econometric methods probit regression model was used to determine factors influence participation in cross border trade in rice between South Sudan and northern Uganda. The probit model was employed to model dichotomous outcome of cross border trade of whether the respondent is a cross border trader or non-cross border trader depending on the factors influence cross border rice trade (Table 2). Equations (2) and (3) show the empirical models applied in this study.

$$CBT = f\begin{pmatrix}\text{No\_Pe\_HO, Yr\_Bus, Main\_Occ, SEC\_}\\ \text{Occ, So\_Rice, Age\_gru, Mar\_Stat, Nat\_ty}\end{pmatrix} \quad (2)$$

In the probit regression model, a project rated (Y) successful is given a value 1 while a project rated unsuccessful is given a value of 0. Successful projects are those rated successful or highly successful. The probability *pi* of having a successful rating over an unsuccessful rating can be expressed as:

$$\begin{aligned} &\boldsymbol{pi} = \boldsymbol{Prob}(\boldsymbol{Yi} = \mathbf{1} \mid \boldsymbol{X}) = \int(\mathbf{2}\pi) - \mathbf{1}/\mathbf{2exp}(-t\mathbf{22}) \\ &\boldsymbol{xi}'\boldsymbol{\beta} - \infty \boldsymbol{dt} = \boldsymbol{\Phi}(\boldsymbol{xi}'\boldsymbol{\beta}) \end{aligned} \quad 3$$

Where Φ is the cumulative distribution function of a standard normal variable which ensures $0 \leq pi \leq 1$, x is a vector of factors that determine or explain the variation in project outcome and β is a vector of parameters or coefficients that reflects the effect of changes in x on the probability of success (Annual, 2016). The relationship between a specific factor and the outcome of the probability is interpreted by the means of the marginal effect which accounts for the partial change in the probability. The marginal effects provide insights into how the explanatory variables

Table 2. Description of variables for the probit model.

Variable Name	Definition of Variable	Expected Sign
NoPEHO	Number of people in household	–
Yr Bus	Years in business	–
MainOC	Main Occupations (trader = 1, non-trader =0)	+
SEC OC	Secondary Occupations (trader =1, non- trader = 0)	+
SORICE	Source of rice (local = 1, imported = 0)	+
AGEGRU	Age group (Dummy young = 1, not young = 0)	–
MAR	Marital status (Married = 1, Unmarried = 0)	-/+
Nationality	Nationality (Ugandans = 1, non – Ugandans = 0)	+

Note. The expected signs in Table 2 indicate a positive, negative or mixed effect on cross border trade.

change the predicted probability of project success (Annual, 2016).

3. Results and discussions

3.1 Socio-economic characteristics

Table 3a presents a cross-tabulation of socio-demographic factors by nationality. The socio-economic characteristics of the respondents were gender, marital status, nationality, age, income, education, main occupation and secondary occupation, number of people in the household and years of cross border trade.

From the results (Table 3a), about 64% of Ugandan traders were males as compared to 91% for non-Ugandans. The number of males was significantly higher than their female counterpart with 36% and 9% for Ugandan and non-Ugandans respectively (p = 0.002). Consequently, gender had a strong association with rice trade. Among the three levels of education, 60% of the rice traders had secondary level education, with no significant associated between nationality of trader and education. About 76% of Ugandans were married while close to 71% of non-Uganda were also married.

Table 3a. Pearson Chi - Square analysis of socio demographics characteristics of rice traders.

	Frequency (Percentage)			
Socio demographic	Ugandan rice traders (N = 102(75%)	Non-Ugandan rice traders (N = 34(25%)	χ^2	P – Value
Gender				
Males	65 (63.7)	31 (91.2)	9.26	0.002
Females	37 (36.3)	3 (8.8)		
Education level				
Primary	29 (28.4)	7 (20.5)		
Secondary	60 (58.8)	25 (73.5)	2.56	0.278
University	13 (12.8)	2 (5.9)		
Marital status				
Married	77 (75.5)	24 (70.6)		
Unmarried	25 (24.5)	10 (29.4)	0.32	0.571
Main Occupation				
Not employed	22 (21.6)	1 (2.9)		
Employed	14 (13.7)	0 (0.0)		
Farmer	13 (12.8)	0 (0.0)	23.23	0.000
Trader	52 (51.0)	33 (97.1)		
Employed & Farmer	1 (0.9)	0 (0.0)		
Source of Rice				
Local grown	73 (71.6)	0 (0.0)		
Imported	12 (11.8)	33 (97.1)	84.03	0.000
Both	17 (16.6)	1 (2.9)		
Secondary occupation				
Not employed	13 (12.8)	2 (5.9)		
Employed	14 (13.8)	0 (0.0)		
Farmer	25 (24.5)	1 (2.9)	24.63	0.000
Trader	44 (43.1)	31 (91.2)		
Others	5 (5.9)	0 (0.0)		

Source: Field survey, 2020.

3.2 Mapping rice value chain between Uganda and South Sudan

3.2.1 Processors

Rice processing involved activities such as buying, threshing rice, loading and offloading, winnowing, transporting, drying the rice to appropriate moisture content before milling, and milling, with each activity attracting some significant cost to different actors in the value chain Table 4 presents summary statistics of the different costs incurred by rice processors in the rice value chain in Gulu and Pabbo in Amuru districts. The cost incurred in buying rice was in terms of transport (43.9%), storage cost (31.7%) and both transport and storage (24.4%) during rice processing. The selling price of rice depends on the varieties in question and level and quality of processing. Consequently over 76% of the consumers consider quality and variety as important factors especially during rice processing. Majority of milling machines were located in Amuru and Gulu district, while close to 59% of processors were not members of any association or cooperative.

In northern Uganda, rice is produced in different varieties. Common varieties included *Ladwi, Kaiso, sindani, Super, Namshea and Nerica*. After production, paddy rice is transported to urban areas such as Gulu, Pabbo, Anaka, Nwoya and Lira Town for processing. Farmers find it difficult to process using traditional methods of threshing rice grain from rice husk since most farmers favor milling before selling. This finding is similar to that of a study in Tanzania which reported that 20% and 30% of the Southern Highland and Eastern Zone farmers respectively preferred milling the paddy before selling (Nkuba et al., 2016).

Table 3b. Comparison t-test of Socio economic and demographic characteristics of rice traders by nationality.

	Mean (SD)				
Variables	Uganda (N = 102)	Non-Ugandan (N = 34)	Mean diff	t-values	P – values
Age	32.2 (9.3)	38.6 (8.4)	6.4	3.70	0.0005***
Dependent of trader	4.83 (2.6)	4.85 (3.0)	0.02	0.05	0.9710
Years in business	5.37 (4.8)	5.59 (4.3)	0.22	0.25	0.8165
Income	2.24 M (1.4 M)	1.13M (1.9 M)	−1.11	0.50	0.6335

Source: Field survey, 2020; where *** denotes level of significance at 1%.

Table 4. Rice value chain analysis of processors by percentage share of costs.

Variable	Response	Frequency	Percentage
Cost incur in buying rice	Transport	18	43.9%
	Storage	13	31.7%
	All above	10	24.4%
Cost consider in selling rice	Quality	3	7.3%
	Quality & Variety	7	17.1%
	All above	31	75.6%
Cooperative	No	24	58.5%
	Yes	17	41.5%

Source: field survey 2020.

The mean age was 32.2 years for Ugandans while 58.8% were high school graduates who do not have financial resources to further their studies (Table 3b). This socio demographic characteristics in line with the study in Sierra Leone where most people have completed secondary school with average age between 20 – 40 years of age (Center for Economic Research and Capacity Building, Sierra Leone, 2017).

It is interesting to note that more males participated in rice trade compared to females. This could be attributed to better access to capital and other resources that males usually have. Additionally, females are usually engaged in other domestic family responsibilities which give them limited time for cross-border business. This result relates to that of a study in Sierra Leone that showed that only 44.2 percent of female traders were involved in cross-border trade (Center for Economic Research and Capacity Building, Sierra Leone, 2017). Among rice processors, cooperative membership was only at 41% with the potential of hampering value chain effectiveness and efficiency of rice crop product. Studies in West Africa revealed that value chains are built through cooperatives (Demont & Neven, 2013). As a Domestic production-based staple-food value chain becomes more competitive, they contribute to food security and income growth. Moreover, by linking producers to consumers through a shared objective, value chains presents a more sustainable approach to consumption and production than segmented and adversarial production chains (Demont & Neven, 2013).

However, about three quarter of rice traded was locally produced. During milling, rice value was added by drying, cleaning, winnowing, sorting stones, processing and packaging. It was found out that there were no de-stoning machines hence making it cumbersome for some of millers to produce quality rice. The cost of milling paddy rice ranged from Ushs 150–200 per kilogram of paddy rice while the quantity of rice milled depended on the number of traders and farmers available per day/month with the quantity ranging from 300 kgs – 3,000 kg daily per processor. A similar study in Tanzania revealed that the large traders stored paddy rice in stores belonging to the owners of milling machines and process when they had contacted traders in Dar es Salam, Tanga, Mwanza and other Towns (Nkuba et al., 2016). The owners of milling machines allow collectors and traders to store their paddy for few months with agreement that they would use their milling machine which store at most 100 tons of paddies with price of milling paddy range between Tsh 50–70 per kg of milled rice (Nkuba et al., 2016). Rice season is usually long and it takes around the month of November to May every year. This is because the majority of rice farmers usually plant rice in the second season. This is a significant factor for traders to do profitable business during long dry season.

The other cost incurred during buying paddy rice is transport, and storage. Transport can be costly especially when the distance from the farm is far and also due to poor and seasonal roads in most rural areas. Paddy rice is usually transported to urban areas in Gulu and Pabbo where milling machines are located. For the rice actors, storage was necessary either the rice produce was in transit, waiting processing or if the trader decided to wait for prices to increase before selling them to the next actor in the chain.

Factors considered for milled rice were quality features including type and variety of rice, aroma, and texture, size of the grain and proportion of broken rice. An important factor in food market is quality, the most widespread distinction used in the rice sector was related to the shape and size of the kernel. This distinction between fine, medium, and coarse rice grains is widely used and well known by farmers as well as traders (Reardon et al., 2012) as they put quality into different categories of fine, coarse and medium as articulated. However, Ugandan rice quality is generally low full of impurities and broken rice (Hyuha & Ekere, 2018). The milled rice was sold at between UgX 2000–2700 per kilogram to Kampala dealers, Sudanese and South Sudanese traders, passengers, wholesalers, market venders and intermediaries. The differences in prices are accounted for by the difference in varieties and quality.

3.3 Value chain Map of cross-border rice trade at Gulu, Amuru (Pabbo), Elegu and Nimule border points

The study identified key rice value chain actors. The key actors were farmers, producers (small, medium and large farmers), collectors, processors, distributors (transporters, traders and wholesalers), exporters and

importers, retailers and consumers. The volume traded varied across the different actors. At different levels, each volume was obtained from rice millers, wholesaler, transporters and retailers (Figure 2).

3.3.1 Export and import traders

Table 5 indicates that 68.9% of rice traders originated from Kampala, imported rice was 7(15.6%) while 7(15.5%) of rice originated from South Sudan. Most of rice imported and produced locally is assembled in Kampala before it is transported to different parts of the country and outside especially the neighboring countries of East Africa community given the evidence that Uganda rice is not competitive globally. As shown in Table 4, the rice originated from South Sudan, 15.5% was imported from Pakistan. This Pakistani rice is smuggled by Ugandan traders from South Sudan for re-sale to Uganda consumers which traders cited it is profit making business because it is better than local grown rice. Such rice is usually sold to consumers in the northern Uganda at relatively high prices.

Most traders stated that a kilogram of rice cost UgX 3000 and they would sell it for UgX 4500. Cross border trade association (CBTA) at one stop border post (OSBP) was not joined by majority of traders and that most traders were not part of the association. This was significantly represented by 95 percent with only 5 percent participated in CBTA (Table 4). Informal traders usually find it hard to join associations. Cross border trade association is the organization representing small cross border traders with small scale traders trading in good less than USD 2000 in the region of East African Community countries (EAC) and the COMESA. CBTA are the mouthpiece to the government, civil society organization on issues relevant to their traders. Its aim is to work for minimization or removal of non-tariff barriers (NTBs) and lobby for the creation of trader friendly policies. Yet most traders are not part of CBTA because they were not educated on the importance of cross border trade association. Following long conflict in South Sudan which has exacerbated numerous business potential including cross border trade (CBT) in food commodities has been limited in recent years. The evident from CBTA chairperson was that association has been neglected by government and international governmental organization since its formation of which it is a member of COMESA, EAC and SADC leading to its insignificant operation across borders including the one of Elegu and Nimule. Cross border trade association not been useful to local formal and informal traders across the border, in addition performing agricultural transaction across the border requires additional documentations within the neighboring countries, the region of EAC and the AfCFTA facilitated by bodies such as cross border trade association (CBTA) with agricultural traders

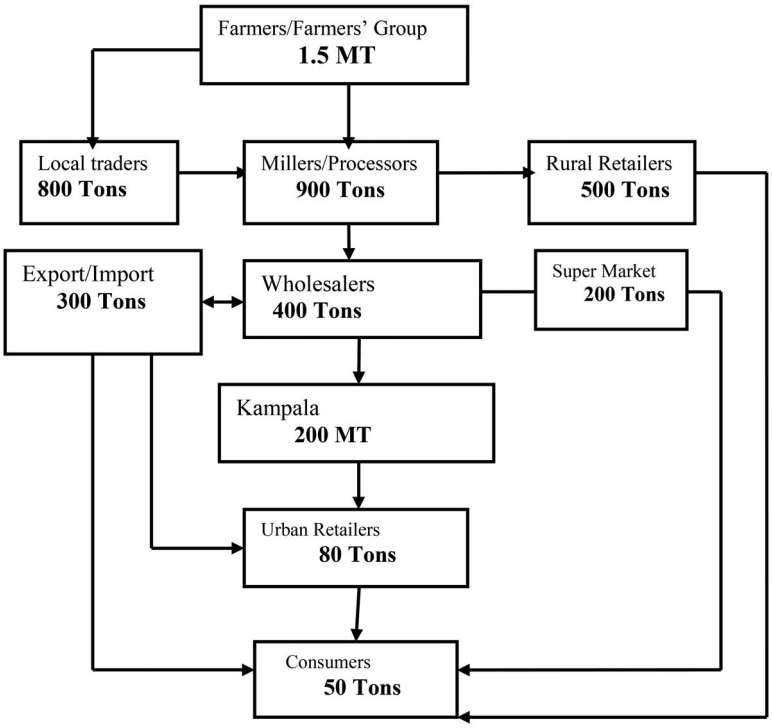

Figure 2. Rice value chain map for cross border trade in northern Uganda.

Table 5. Characteristics of export and Import of rice value chain.

Exporters and Importers Trade			
Variable	Response	Frequency	Percentage
Origin of Rice	Kampala (U)	31	68.9%
	Imported	07	15.6%
	South Sudan	07	15.5%
Cross border trade association (CBTA)	No	41	95.3%
	Yes	2	4.7%
Effect of exchange rate	Positive	2	4.8%
	Negative	29	69.0%
	Both	11	26.2%
Mean of transport	Vehicle	26	61.9%
	Motorcycle	13	31.0%
	Cart	3	7.1%
Challenges	Tariffs	6	14.3%
	Exchange rate	16	38.1%
	Delay on clearance	8	19.0%
	All above	12	28.6%
East Africa Community Tax (EACTAX)	No	41	97.6%
	Yes	1	2.4%
Credit/Loan	No	38	90.5%
	Yes	04	9.5%

Source: field survey 2020.

complying with this regulations under the umbrella of official cross border trade become an added advantage in the long ran (UNFAO, 2018b).

With regards to the means of transport, about 62% was by vehicles with 31% and 7.1% of traders used motorcycle and cart respectively depending on the distance the trader was transporting rice. One of the main challenges was exchange rate 16 (38.1%) while the least was tariffs 6 (14.3%) citing fluctuating rate of United State Dollar (USD) in the Black Market. Over 98% of the respondents do not pay east African community custom duty tax meaning EAC do not charge custom duty. Moreover, 90.5 percent did not have loan or credit. They only started business with their own small capital. Rice exported to South Sudan passes through Kampala to Juba, the capital of South Sudan and imported to Uganda by small retails rice traders.

This study indicates that over two third of rice traded originated from Kampala. Most of rice imported and produced locally is processed and parked in Kampala before being transported to different parts of the country and outside especially the neighboring countries within the East Africa community. A study in Pakistan revealed that regional trends indicate the geographical concentration of imports, exports, and demand for rice products. The rice traded in South Sudan was mainly imported from Pakistan (East Asia). This Pakistani rice was imported by Ugandan traders for re-export because of its quality and affordability. Most traders anticipated that a kilogram costs UgX 3000 (USD 1.0) and they would sale it UgX 4500 (USD 1.3) which was a volatile profit margin.

Studies revealed the market for semi/wholly milled rice is common in Asia and Africa, with Middle East and North Africa having the highest market share for milled rice and Sub-Saharan Africa (SSA) countries among the least. SSA countries have the highest imports for broken rice (Siddiqui, 2016). Similar studies in line with this have shown that SSA produces rice mainly for domestic consumption. This was due to slow exported observed on these countries (Siddiqui, 2016). After the 2007–2008 financial crisis, many rice consuming countries became reluctant to depend on imported rice and have rolled out measures to improve self-sufficiency by expanding rice production and reducing foreign rice dependency (Siddiqui, 2016).

A large majority of the traders were not members of the cross-border traders association (CBTA) at the one stop border post (OSBP). The cross-border trade association is the organization representing small cross border traders than USD 2000 in the East African Community (EAC) and the COMESA region. This study is inconsistent with cross border trade in agriculture from East and Central Africa where many traders opted to form self-help groups as opposed to organizing themselves in cross border trade Association (CBTA). This helps them to tackle issues such as imperfect and asymmetric information and lack of transparency on the benefits accrued from trade agreements and protocols prevailing at the border points (Hannah et al., 2016). However, cross border association is undermined by lack of trust and also inadequate funding to run the association. Although the association is known by governments of EAC countries as an important instrument in supporting small traders across the border point, it is not put in to consideration.

The fluctuating exchange rates had a negative effect on majority of the traders. During the survey, there was high inflation in South Sudan with USD 100 being exchanged for about South Sudanese Pounds (SSP) 34,000, while, USD 100 was being exchanged for Uganda Shillings (UgX) 366,000. This exchange rate was low and was very volatile. The finding was consistent with several studies. For example in Nigeria the economic community of west African states (ECOWAS) sub-region cross border trade revealed that exchange rate was the main challenge facing women cross border traders (Yusuff, 2014).

Over nine in ten traders did not have any running loans at the time of study. Most of traders in this study were small and were operating with own capital and with the revolving savings from the groups they belonged to. Similar studies have shown that since capital is the driving factor of trade from different

sources male and female traders often rely on personal savings as their main source of capital, other financing sources include loans, micro-credit schemes, revolving saving groups, friends and relatives and, to some extent, self-help groups (Hannah et al., 2016).

Rice exported to South Sudan passes through Kampala to Juba the capital of South Sudan through Nimule town, because of proximity of two border market of Nimule and Elegu border, rice is imported to Uganda by small retails rice traders who traded rice in Elegu border market town. The traders stated that there was significant improvement in rice trade however there is a lot of restriction especially by Ugandans authorities.

3.3.2 Wholesalers and retailers

When the rice is processed, it is sold to urban wholesalers in Kampala, Gulu and Pabbo and the rest by regional transporters to neighboring countries. The rest of milled rice is sold in local market by retailers along road the side or nearby shop. Table 6 shows the characteristics of wholesalers and retailers of rice across the border point of Elegu and Nimule rice value chain. The wholesalers and retailers (Table 6), indicate the quantity of rice milled. After the rice was milled, over 71 (75.5%) stored in larger wholesales for retailers and traders to buy. Over 12 (12.8%) from transporters and international traders most of whom are officially registered international traders of rice exports. Farmers only account for 7 (7.4%) of wholesales and retails trade. With regards to the type of trade, about 74 (78.7%) were selling as retails traders. Wholesalers and retailers sell directly 68 (72.3%) to consumers at a cost of ranging from UgX 3000–5000 per kilogram of rice.

Table 6. The characteristics of wholesalers and retailers of rice value chain.

Wholesales and retails traders			
Variable	Response	Frequency	Percentage
Source of rice	Farmers	7	7.4%
	Local prod & Ass	4	4.3%
	Transporters & Intl	12	12.8%
	Wholesalers	71	75.5%
Type of trade	Wholesale	10	14.9%
	Retail	74	78.7%
	Both	6	6.4%
Factors consider in Selling rice	Quality	18	19.0%
	Demand & supply	32	34.0%
	Festive season	11	11.7%
	All above	33	35.3%
Sale rice to	Retailers	16	17.0%
	Consumers	68	72.3%
	retailers	10	10.7%
Selling price	1200 – 2900	32	34.0%
	3000 – 5000	62	66.0%

Source: Field survey 2020.

Wholesalers and retailers constituted a large proportion of the traders in this study. Most of the rice traded was stored in larger wholesales store and later sold to retailers and direct consumers. Factors considered by consumers were mainly quality, although the demand of rice follows a seasonal pattern. The selling price of rice on average was UgX 3400 (about USD 1.0) per kilogram. Because of proximity of two border markets of Nimule and Elegu, the Pakistani rice was imported from Nimule border market by Ugandans traders for rescales because of its quality and its relatively cheap price compared to Uganda rice. Most traders cited that a kilogram costs UgX 3000 and they would sell it for UgX 4500 which give a volatile profit margin. Similar studies have shown that the comparative advantage of local rice production in Africa has been one of the key issues in food- policy debate in the context of African rice sector due to its low quality and low price by rice consumers and producers (Demont & Neven, 2013). The major business constraints faced by rice traders were the high transport cost, price fluctuation, and competition from Pakistani rice was attributed to several factors including the high cost of aromatic rice, high rent and lack of storage facilities, in addition to high taxes charged by Uganda Revenue Authority (URA) on rice imported from South Sudan.

3.4 The rice value chain Map in Elegu – Nimule border post

Among the actors involved in the rice value chain are farmers. Farmers in rice production play a significant role in the value chain along the distribution channel. The crop is harvested by local farmers and transported to the millers for processing; the local farmers produce on average about 1.5MTons of paddy rice which indicated that most rice farmers/farmer groups are smallholder rice farmers and therefore are not in a position to produce in large scale. Millers would buy paddy rice from farmers and mills it and later sold to wholesalers and retailers. As the rice moved along the value chain to processors, middle men (local traders) would buy at the farm gate usually at lower price. Such rice is usually sold to processors. The key component of value chain is the marketing to consumers from processors. Close to 30% of total rice paddy was milled and distributed to wholesalers, retailers, and traders, transporters while the rest of rice was imported with the aim of meeting local consumptions and later exported. Among the respondents interviewed about the source of rice 76% stated that wholesale stores

where rice was kept and then resold to retailers and around 80% (over 150 tons) of retailers were engaged in doing business in final consumption markets. The export and import market were dynamic and competitive with an approximately 150 tons against local rice to compete with two third of rice assembled from Kampala and later transported to the rest of major towns and the neighboring countries.

Majorly, local rice could be overwhelmed by imported rice which is much pervasive and sold in the supermarket because of its quality and relatively cheap though the aromatic rice locally referred to as *super* rice has presumably better aroma, its betterment has been overly indulged by impurities such as stones and broken rice. In comparison with other value chain, rice follow similar trend with other cereal and grains such as maize and sorghum. Though with similar trend, rice value chain lagged behind due to limited local production along the value chain especially most farmers are smallholder farmers in northern Uganda with impoverish milling machines. However, their contribution is insignificant compared to other commodities. For instance, annual maize production increased from 1.2 Million MT in 2001 to 2.4 Million MT in 2012 which is consumed domestically while from the same period export to neighboring countries such as Kenya and South Sudan volume 61,603MT worth USD 18 Million in 2001 to 174, 776 MT worthily about USD 60 Million in 2012 (Elepu, 2014).

3.5 Factors influencing participation in cross border trade

The results presented in Table 7 indicate that years of experience in business significantly at ($p < 0.05$) negatively influenced participation in rice cross border trade. A similar study by Economic Community for Africa (ECA) revealed that on the trading history, the more experienced the traders, the less they may want to participate in agricultural CBT as sellers (Hannah et al., 2016). This result was somewhat surprising as one would expect experience in trade to be positively correlated with both probabilities of buying and selling across the borders. One reason could be that other factors such as age and frequency of trading activities could influence traders' adaptability and resilience to potential barriers affecting selling activities (Hannah et al., 2016).

Similarly, trade as a main occupation was negatively statistically significant at 5%. According to studies carried out by Ayoki (2017), rice demand is growing and continues to grow because the increasing population growth rate and the change in consumption patterns. This changing consumption patterns is attributed increasing incomes. Results also showed a percentage increase in trade reduced the likelihood of engaging in cross border trade among buyer and sellers by 0.95%. A similar study in EAC of Agricultural CBT revealed that the more experienced the traders, the less they may want to participate in agricultural CBT as sellers and hence leading to decrease in sellers and buyers that the trade was expected to be positively correlated with both probabilities of buying and selling across the borders. One reason could be that other factors such as age and frequency of trading activities could influence traders' adaptability and resilience to potential barriers affecting selling activities (Hannah et al., 2016).

Traders in locally grown rice [Nationality ($p < 0.001$)] significance level were more likely to participate in rice cross border trade. Study on the determinants of imported rice in Uganda revealed that a percentage increase in quantity of rice produced domestically will lead to a close to 2% reduction in rice imports (Hyuha & Ekere, 2018). This means that as domestic

Table 7. A probit regression results of cross border participants.

Variables	Coef	Std.E	p-value	Marginal effect
Households number (Hno)	−0.136*	0.079	0.085	−0.021
Number of years in business (YB)	0.095**	0.041	0.019	0.016
Main occupation (MO)	−0.887*	0.471	0.060	−0.001
Secondary occupation (SO)	−0.369	0.429	0.389	−0.138
Source of rice (SR)	2.446***	0.548	0.000	−0.062
Marital Status (Mar)	−0.235	0.440	0.594	0.394
Nationalities (N)	−1.432***	0.435	0.001	−0.029
Constant	0.085	0.652	0.896	−0.237
Mean dependent var	0.324		SD dependent var	0.470
Pseudo r-squared	0.541		Number of obs	136.000
Chi-square	92.575		Prob > chi2	0.000
Akaike crit. (AIC)	94.650		Bayesian crit. (BIC)	117.951
Max VIF			1.61	

Source: Field survey, 2020.
Note. ***, ** and. * denotes significance at 1%, 5% and 10% respectively.

production increases, imports decreases steadily leading to a saving in foreign exchange (Hyuha & Ekere, 2018). About 40 percent of domestic demand is met by external supplies. Most of these supplies, apart from those that enter the country through informal channels, are geared towards middle class consumers (Tull, 2017).

Similarly, traders who were Ugandans locals (Nationality $p < 0.000$) were more likely to participate in rice cross border trade along the Elegu-Nimule border. This finding is attributed to the presence of locally produced rice that is usually traded by the local traders. It is also due to the efforts of Government of Uganda (GoU) through the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) intended to increase rice production sufficiency with a primary target of meeting the local food security demands and later export any surplus (MAAIF, 2018). However, Kilimo Trust asserted that, the failure by the sector to thrive even under the high tariffs on imported rice, when these were fully implemented by Tanzania and Uganda, is an indication that the sector is not resilient (Kilimo, 2014). Despite output growth, regional rice production still lags in demand, around one quarter of rice consumed was sourced from international market specially Pakistan and other Asian counties leading to wide price difference amidst import dependency over the period (Ghins et al., 2019).

4. Conclusions and policy recommendations

This research paper focuses on Cross Border Trade Analysis of the Rice Value Chain between Northern Uganda and South Sudan. Where it discusses two questions to categorically understand the drivers of cross border trade in rice; 1) what configuration factors in the rice value chain in Northern Uganda and South Sudan? and 2) what factors influence cross border rice trade between Northern Uganda and South Sudan?, The rice value chain mapping from processing all the way to retailers, farmers have significant prospective in dominating rice market in Northern Uganda except in South Sudan where there is minimal evident of local rice production with option of consumption from exports. It is evident that there is potential in local rice production given that more smallholder farmers in Northern Uganda are willing to venture into new market of rice production which brings better income in their household. It is therefore concluded that along the value chain, consumer preference has the subject of discussion given Uganda rice is not yet competitive due to challenges of low quality, being highly broken, of mixed varieties and contain impurities such as stones to put things into perspectives rice as industry in the world market Uganda as a National in National Development plan (NDP) 2008–2018] priorities as an engine for development should (1) improve post-harvest handling, processing and marketing. 2) support policy development and improve access to formal trade across borders. On the key components of rice value chain, rice industrial sector still has a long way to go in achieving self-sufficiency in northern Uganda. Despite this, the smallholder farmers should increase production in rice sector for the sufficiency requirement. This is to ensure that stakeholders' participation in rice project development is crucial in addressing most of production challenges faced by farmers in northern Uganda. The probit regression model revealed that National local rice traders have significance correlation at 99 percent level of significance which has proved the significance local rice production in attending self sufficiency. This is in line with government of Uganda vision and intention to increase rice production with a primary target of meeting local food security demand and later export any surplus

To enhance competitiveness and quality of rice, value chain actors are to have cooperative membership that will improve rice crop produced. The government should find ways of funding opportunities to increase efficiency and effectiveness of rice industry in Uganda. There should be proper monitoring and funding for cross border trade association (CBTA) by the government of Uganda and South Sudan and non-state actors to support smallholder traders who are not able to pay high duty tax. This will improve their trading opportunities not only in rice sector but also in other agriculture commodity sector. Access to information to join the cross-border trade association is important for easy entry and exit from the border point.

Uganda rice (*super*) is more expensive than the imported rice because of its aroma although there is little improvement on the quality which has enabled other superior imported rice such basmati rice from Pakistan to be highly preferred in the market. However, the government of Uganda should provide subsidies to reduce the price of local rice produced. Further, they should provide de-stoning and new milling machine to farmers and processors through cooperative association in the major districts that grow rice to improve their farming enterprises and improve their economics potential. Rice sector development in South Sudan is still minimal in term of production and value addition shown by the evident

from the survey, government should devise policies particular the ministry of Agriculture and food security in ensuring domestic rice production promotion to smallholder farmers

Notes

1. https://www.researchgate.net/publication/349118299_Sample_Size_Determination_Using_Krejcie_and_Morgan_Table.
2. Sample Size determination using Krejcie & Morgan Table, Research gate Abdul & Burkari,2021.

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Disclosure statement

The authors declare that there is no conflict of interest in this paper.

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