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IMPACT OF FARMER GROUP DYNAMICS ON MAIZE-SEED VALUE CHAIN PARTICIPATION IN BARINGO SOUTH, KENYA

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ABSTRACT

Collective action is key in unlocking the full potential of African agricultural value chains. Effective organization of farmers into producer groups is a crucial driver for the successful adoption of research insights by farmers (Lammers & Winter, 2020). There is limited systematic research into the impacts of farmer group dynamics on the farmers' continued participation in the maize seed multiplication programme in Baringo South Sub-County. Quantitative data was collected using the individual respondent questionnaires administered to 366 sampled farmers with 95.08% response rate. Regression analysis by use of the estimated coefficients (β values), standard error, significance values and odd ratio of independent variables were used to assess the relationship between independent and dependent variables. The result depicts that most representing 71.6% of the respondents were male in comparison to 28.4% female. Majority of farmers attained basic level of education at 35.6% and 32.8% secondary and primary levels respectively. The dominance of an energetic population aged between 20 to 49 years representing 89.7% cumulatively is worth to note. From the results, the odds of farmer continued participation among farmers who perceived their group leaders as being un-transparent was 0.081 lower. These results imply the centrality of openness and accountability of leaders to their members in bid to ensure sustained participation in farmer group related activities. This is especially true in a context like the maize seed multiplication programme in Baringo South where farmer group leaders play a key role synonymous to a conveyor belt between participating farmers and the contracted seed company. The probability of continued participation was also 0.739 lower among farmer with limited knowledge of the seed company contractual arrangement. The study further noted that, of all the farmers interviewed, 50.3% had limited

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knowledge with regard to contractual arrangement that existed between them and the seed company with only 12.4% reporting full understanding. The study concludes that, transparency and accountability of farmer group leaders to their members should remain the foundation for successful engagement in their group endeavors. Capacity building of farmers and particularly their group leaders on good governance and negotiation skills is also critical in amplifying farmers' voices in decision making processes. On contractual engagements, there is need to capacity build farmer groups to embrace formal legitimate contracts to allow third party enforcement in the event disagreements arise.

Keywords: Farmer group dynamics, continued participation, Agricultural value chain

1. INTRODUCTION

The concept of inclusive business in global development policy and discourse has become fundamental in efforts geared towards resolving of challenges. The inclusive business model in agriculture is of paramount importance for farmers as it aims to integrate smallholder farmers and marginalized communities into the agricultural value chains. This approach fosters equitable economic growth, enhances livelihoods, and promotes sustainable agricultural practices. Agriculture remains the single most important productive sector in low-income nations in terms of share as well as employment (Food and Agricultural Organization [FAO], 2018). The starting point for a world without poverty and hunger is the rural world because an estimated 3.4 billion people (around 45 per cent of the global population) live in the rural areas of developing countries (FAO, 2017). Viable and productive small-scale farming sector with strong market connections is a critical foundation for more inclusive rural economic and livelihood development. According to IFAD (2021), there is need to reduce transaction costs and increase productivity and profitability so that small-scale farmers can be competitive and take the risk of responding to new opportunities. Evidently, collective action will go a long way in unlocking the full potential of African agricultural value chains thus contribute to food security and foster inclusive economic growth. Addressing the weaknesses of product markets calls for institutional developments such as the promotion of contract farming, support for cooperatives and other producer organizations, the existence of dispute settlements mechanisms and the promotion of effective governance of agricultural value chains (Suwadu and Hathie, 2020). According to Frezer (2020), small-holder farmers, amongst other disadvantaged groups within value chains have weaker positions in negotiating trade terms resulting to less opportunity to draw value for their farming ventures.

Since inclusivity in agricultural value chains is a pre-requisite for improved agricultural production among small scale rural farmers (FAO, 2020), there is every need to determine the

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impact of farmers group dynamics, on their effective and sustained participation of farmers. Farmer groups, also known as farmer organizations or cooperatives, have emerged as essential actors within this value chain. These groups bring together smallholder farmers, enabling them to collectively address challenges, access resources, and share knowledge and best practices. Effective organization of farmers into cooperatives or producer groups was a crucial driver for the successful adoption of research insights and innovations by farmers (Lammers and Winter, 2020.According to Cruickshank, Grandelis, Barwitzki and Bammann, (2022), how the value chain is organized and managed under their governance structure has great consequences for progression because the power dynamics between actors influence the decisions made and the follow through for the implementation of progression actions. Chengappa (2018) noted that agricultural value chains that have realized success exhibited some kind of formal or informal collective engagements like farmer Self-Help Groups [SHGs], cooperatives or associations. This is because farmer organization offers members services ranging from livelihood plan development to collective marketing of agriculture produce. Many other studies point to the importance of local institutions and networks in fostering climate action. Muricho (2011) reported that promoting joint actions by small-scale producers and their representatives through producer organizations, cooperatives, associations, enterprises, will be key to enhance opportunities and reduce threats. According to Thorton, Loboguerre, Campbell, Kavikumar, Mercado and Shackleton (2019), one key challenge that must be acknowledged with regard to leadership structures in the producer organizations relates to their accountability. In their opinion, these authors argue that group leaders may not always be true representatives of the groups that they are supposed to represent. In light of the farmer organization challenges noted by Thorton et al., (2019), other researchers like Berquist and Dinerstein (2019) recommend the need to always validate through participatory approaches that the real needs of the targeted groups are being addressed. Organizing farmers to meet the demands of value chain actors is a critical success factor in enhancing market systems. From Wouterse and Francesconi (2016) perspective, a well-managed democratic farmer organization gives farmers a common voice and is an effective vehicle for accessing inputs and training. Capacity building of farmer organizations with the requisite skills remains an important aspect in enhancing smallholders' inclusion through collective engagement and negotiation with other actors along the value chain (Berdegue &Proctor, 2015). However, many farmer organizations are not performing optimally and require additional tools to be able to effectively play an intermediary role. Significant proportion of people living in poverty in Kenya, particularly in the arid and semi-arid lands like Baringo County, are directly dependent on agriculture and natural resources for their livelihood and food security. According to the 2019 population Census, Baringo county's multi-dimensional poverty incidences is estimated at 60.3% in comparison to National multi-dimensional poverty rate estimated at 53.0%. The role of Government and private Agencies

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(seed companies) in promotion of agricultural value chain specifically on maize seed multiplication among Baringo South farmers for more than 20 years is worth to note. Despite the economic opportunities that maize seed multiplication programme presents to farmers in Baringo South, some farmers have become exiting the programme in preference for other crops. Empirical studies that explore the factors influencing farmer continued participation are lacking, particularly those that consider the dynamics of farmer group interactions. For this study, the concept of farmer group dynamics encompasses elements such as group leadership structure, decision-making processes, trust levels, communication channels and conflict resolution mechanisms among others within the group. There is limited systematic research into the impacts of farmer group dynamics as a key determinant for inclusive agricultural value chain on the farmers' continued participation in the maize seed multiplication programme in Baringo South Sub-County. Understanding the influence of these dynamics on farmers' participation is crucial for sustainable agricultural development and the overall success of the agricultural value chains.

2. MATERIALS AND METHODS

This chapter outlines the research methodology adopted in the quest to address the objective of this study. The chapter is organized into the following sections: research design, sampling techniques, data collection instruments, and data analysis procedures.

2.1 Research design

This study employed a mixed-methods research design, combining both descriptive and survey methodologies to comprehensively assess the impact of farmer group dynamics on farmer participation in maize seed multiplication programme in Baringo South Sub-County in Kenya. The descriptive design provided a comprehensive and detailed description of the socio-economic characteristics of farmers in the maize seed multiplication programme in Baringo South. The study also employed survey research design by use of structured questionnaire administered to a representative sample of participants. Quantitative data was collected and subsequently analyzed to draw meaningful conclusions about determinants of inclusive agricultural value chains. The choice of survey design was because of its ability to offer a systematic and efficient approach to gather data from a diverse range of respondents, thus allowing room to generalize findings to the broader population.

2.2 Population and Sample

Maize seed multiplication programme in Baringo South Sub-County is coordinated between seed companies and farmer organizations (referred to as Registered Growers) distributed within the sub-county depending on their locality. After the production and processing of the seed maize,

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payments are done to the farmers through the registered grower. There are 27 registered growers with approximately 4286 farmers participating in seed maize farming. Multi-stage sampling technique was used to select the representative sample. Purposive sampling was used to select Baringo South Sub County because of it being a prime maize seed production area in Baringo County. Secondly, simple random sampling was used to select six out the 27 maize seed farmer grower groups where the study was undertaken. Thirdly, required sample of farmers to be interviewed were drawn from each of the six selected farmer grower groups apportioned proportionately to number of farmers in the group. In the final stage of sampling, systematic simple random sampling was used to select the participants of the study from each of the six selected groups. This study used a confidence level of 95%, a margin of error of 0.05.

The formula for calculating sample size according to (Kothari, 2004), is given as:

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

Where:

N = population size
e = margin of error
n= required sample size

To determine the ideal sample size for a population size of 4286 maize seed farmers in Baringo South, at 95% confidence level and a 0.05 margin of error, the required sample size for this study was calculated as follow:

$$n = \frac{4286}{1 + 4286(0.05^2)}$$

$$n = \frac{4286}{1+10.715}$$

$$n = \frac{4286}{11.715}$$

Therefore;

$$\boldsymbol{n} = \mathbf{365.855 = 366}$$

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Table 1: The Registered Growers Groups and numbers sampled from each

Registered Grower	Number of Farmers under the grower	Sample size
Perkerra Mixed farmers	170	35
Murda	186	38
Mosuro farmers' cooperative	380	78
Loboi farmers	194	40
Marigat Farmers	600	124
Ilkateyo	249	51
Total	1779	366

2.3 Data and Sources of Data

Quantitative data was collected using the individual respondent questionnaires. A total 366 questionnaires were administered out of which 348 were returned giving 95.08% response rate. Key Informant interviews (KIIs) were the main sources of qualitative data. An extensive literature review was also done to obtain the secondary data, demographic and institutional aspects of the study area.

2.4 Reliability of research instruments

For this study, internal consistency technique was used to ensure reliability of the research instrument. A pilot study of the farmer questionnaire was carried out in Wasu maize seed irrigation block in Baringo South. The irrigation block was not among those used in the study but it has almost similar social-cultural, climatic and geographic conditions as the study site. Reliability of the study instruments was therefore estimated through a pilot study on 55 farmers in Wasu irrigation block. The outcome of the pilot testing was useful in revising the items on the questionnaires in order to improve its reliability. Cronbach's Coefficient Alpha; which is a general form of the Kunder- Richardson (K-R) 20 formula was then computed to determine how items correlate among themselves. A reliability coefficient of r=0.8 obtained for this study implied that the data collection instrument was consistent and reliable.

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2.5 Validity of the data

To achieve face and content validity the research tools, the instruments were validated in consultation with five experts in the Department of Agricultural Education and Extension to assess whether the instruments had clear and appropriate content to measure the objectives of the study. In addition, experts in measurement were consulted to further validate the research instruments. The comments and suggestions made were incorporated to improve the quality of the instruments and ensure the results and inferences of the study are accurate and meaningful.

2.6 Statistical tools used

Both descriptive and inferential statistical techniques were used for data analysis. Descriptive analysis was done to produce frequencies, percentages and means. Data was subjected to statistical tests using Statistical Package for Social Scientists (SPSS) version 25, which was the main data analysis software. Correlation analysis using Pearson Correlation Coefficient(r) was used to analyze the degree of relationship between the study variables at 0.05 significance level. Regression analysis by use of the estimated coefficients (β values), standard error, significance values and odd ratio of independent variables were used to assess the relationship between independent and dependent variables of the study.

3. RESULTS AND DISCUSSION

3.1 Background information of the respondents

3.1.1 Gender representation of farmers in maize seed multiplication in Baringo South

Result depict that most 71.6% of the respondents were male in comparison to 28.4% female. This could be related to cultural factors that limit women to majorly household chores and other less demanding farming ventures compared to the male gender with ability and flexibility to take part in diversified income generating interventions. Despite their substantial participation in agriculture, women work on subsistence crops, and are less involved in higher value-added activities. Latif (2023) observed that, women farmers face unique barriers in accessing agricultural information because are less likely to be targeted by formal extension programs partly because they are often marginalized, have less agricultural decision-making power within their own household and can be less connected to community social networks. Gender inequality continues to be a pertinent issue in Kenya. According to World Food Programme [WFP] Kenya 2022 annual country report, Kenya was ranked number 134 out of 189 countries on Gender Inequality Index (GII). Despite women making 75% of the smallholder agricultural labour force, prevailing gender-related socio-cultural customs, limited autonomy in decision making,

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leadership and institutional barriers, unequal access and control over productive resources continue to exclude them from equal participation, contribution and benefitting from sustainable and transformative agricultural systems (WFP, 2022). Study conducted by Lutomia, Obare, Kariuki and Muricho (2019) in nine counties of Western and Eastern Kenya observed that women input in productive decisions, asset ownership, access to and decisions on credit, control over the use of income and group membership were positively and significantly associated with higher agricultural yields, with the input in productive decisions recording the highest effect.

3.1.2 Age distribution of farmers in maize seed multiplication programme in Baringo South

The age distribution of farmers holds immense significance in shaping the future of agriculture. Understanding the age distribution of farmers is essential for comprehending the dynamics of the agricultural sector by providing valuable insights into the composition of the farming workforce and thus shading light on how different age groups contribute to agricultural practices, knowledge transfer and innovation. Table 2 presents the age distribution of the farmers in maize seed multiplication programme in Baringo South sub-county.

Table 2: Age distribution of farmers in maize seed multiplication programme in Baringo South

Age bracket(years)	Frequency	Percentage
20-29	104	29.9
30-39	121	34.8
40-49	87	25.0
50-59	25	7.2
Above 60	11	3.2
Total	**348**	**100.0**

From Table 2, the dominance of an energetic and still productive population aged between 20 to 49 years representing 89.7% cumulatively is worth to note. This observation can be attributed to the many youth with no formal employment and opt to engage in agricultural activities as a way of sustaining their livelihoods. According to the 2019 Kenyan Population and Housing Census, 46.8% of Baringo County population are outside the labour force thus remain highly vulnerable. Suwadu and Hathie (2020) noted that, a clear and integrated approach that addresses the existing impediments related to knowledge gap, access to farming land, access to financial services, access to markets and involvement in policy dialogue can provide an additional momentum needed in enhancing youth participation in agriculture thus drive widespread poverty reduction among youths and adults alike. Cruickshank, Grandelis, Barwitzki and Bammann (2022)

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emphasized that, young people are best placed to rejuvenate the agriculture sector, acquire the knowledge and skills needed to innovate, uptake new technologies and spearhead the digital transformation.

3.1.3 Education levels for farmers in maize seed multiplication programme in Baringo South

The educational background of farmers plays a fundamental role in shaping their understanding of agricultural best practices, innovative technologies, and sustainable resource management. Examining the education levels of farmers is crucial for understanding how education impacts decision-making processes, adoption of new practices and overall farm productivity. Respondents were also asked to indicate the highest-level education attained as presented in **Table 3**. The study observed that majority of Baringo South farmers attained basic level of education with a majority having attained 35.6% and 32.8% secondary and primary levels respectively.

Table 3: Education levels for farmers in maize seed multiplication programme in Baringo South

Education level	Frequency	Percentage
None	30	8.6
Primary	114	32.8
Secondary	124	35.6
Tertiary	80	23.0
Total	**348**	**100.0**

Still as observed in **Table 3** is a remarkable 23% of farmers with tertiary education (middle level colleges and universities) who are possibly in salaried employment and still taking part in farming. The later could be explained by the fact that this category with higher level of education is involved in other off farm economic activities from which they draw income to sustain their farming ventures. From this study, it can also be argued that, higher level of education among farmers can act as a catalyst for positive change in agriculture as it empowers them with knowledge, skills and a forward-thinking approach in various ways. According to Kirtti, and Phanindra (2018), farmers who completed minimum education of secondary level were more likely to adopt modern rice varieties. Attaining a minimum threshold level of education helps farmers in ways of enhancing their skills and capabilities to collect and analyze the information and execute that in the field. On the contrary, Mugumya, et al. (2015), reported that, more educated farmers had lower odds of participating in an inclusive value chain as compared to those who had attained only up to primary level of education.

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3.2 Farmer group dynamics and farmer participation in maize-seed multiplication programme

Exploration of the influence of farmer group dynamics on farmers' continued participation in the agricultural value chain sheds light on the critical role of collective action in fostering resilient and prosperous agricultural systems. By understanding these dynamics, development actors in agricultural sector can work towards creating an enabling environment that empowers farmers and ensures their active engagement in the value chain, ultimately leading to inclusive and sustainable agricultural development. **Table 4** presents the results of binary logistic regression for selected farmer group dynamics factors on farmer participation in the maize seed agricultural value chain among Baringo South Farmers. Farmer group dynamics considered for this study includes; transparency among group leaders, inclusivity in decision making, equality leadership opportunity for men and women and farmers knowledge on contractual arrangements with seed companies.

Table 4: Logistic regression of farmer group dynamics on farmer participation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	Un-transparent farmer group leadership	-2.517	.321	61.610	1	.000	.081	.043	.151
	Inclusive decision making	.055	.459	.014	1	.905	1.056	.429	2.599
	Equal opportunity in leadership	-.085	.148	.332	1	.565	.918	.686	1.228
	Knowledge on contractual arrangement	-.302	.209	2.085	1	.049	.739	.491	1.114
	Constant	3.331	1.123	8.795	1	.003	27.975		

a. Variable(s) entered on step 1: un-transparent farmer group leadership, Inclusivity in farmer group decision making, Equal opportunity in leadership and Farmer knowledge on contractual arrangement with seed company.

As observed in **Table 4**, out of the four variables regressed against farmer participation in maize value chain in Baringo South, two were statistically significant. These included untranparency in farmer group leadership and farmer knowledge on the contractual arrangement with the contracting seed company which had negative impact on farmers' continued participation at signicance levels of 0.000 and 0.049 respectively.

3.2.1 Transparency in farmer group leadership and farmer continued participation

From **Table 4**, the odds of farmer continued participation in the maize seed multiplication programme among farmers who perceived their group leaders as being un-transparent was 0.081

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lower with 95% CI of 0.043 to 0.151. These results imply the centrality of openness and accountability of leaders to their members in bid to ensure sustained participation in farmer group related activities. This is especially true in a context like the maize seed multiplication programme in Baringo South where farmer group leaders play a key role synonymous to a conveyor belt between participating farmers and the contracted seed company. This is in tandem with Thorton, et al (2019) who noted that accountability systems in farmer organizations remain an hinderance to optimal group perfomance. Because of self-interest, group leaders may not always be true representatives of the groups they are thought to represent. Rantlo, Tsoako & Muroyiwa (2020) highlighted the reasons given by farmers for dissatisfaction with the farmer cooperatives as lack of (financial) transparency and delay in payments. According to Rugema, Sseguya and Kibwika (2018), trusted and empowering leaders played a critical role in maintaining and sustaining participation of smallholder farmers in the rice value chain activities in Uganda because they created openness, honesty and connectivity that enhanced farmers' trust and willingness for continued participation in rice production.

3.2.2 Farmer knowledge on contractual arrangement and their continued participation

As presented in **Table 4**, the probability of farmer continued participation in maize seed multiplication programme was 0.739 lower among farmer with limited knowledge of the seed company contractual arrangement with 95% CI of 0.491 to 1.114. **Table 5** captures further analysis done on maize seed farmers' knowledge on contractual arrangements with contracted seed companies. The study noted that, of all the farmers interviewed, 50.3% had limited knowledge with regard to contractual arrangement that existed between them and the seed company, only a small percentage reported full understanding. According to Grandval (2023), some level of interdependence between value chain actors is essential for agricultural value chains to thrive. In Benin, for example, the rice value chain is characterized by a strong relationship of interdependence between producers and processors (rice mills).

Table 1: Farmer knowledge on contractual engagement with Seed Company

	Frequency	Percentage
Fully understands	43	12.4
Somehow understands	130	37.4
Limited understanding	175	50.3
Total	348	100.0

This limited understanding can be attributed to the fact there is no written/signed agreement between individual farmers and the seed company. This observation relates with results of a study by Nyokabi et al., (2023) that showed that milk and meat value chains in Ethiopia were

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complex in terms of their composition, the relationships and governance structures between actors. As seasons passed by, some maize seed farmers in Baringo South developed mistrust due to past experiences of maize seed buyers' failure to purchase produce as per the terms agreed in the beginning of the season. Limited transparency concerning input delivery in some occasions created situations where farmers felt disappointed by undisclosed delays. This observation is closely related to the weak and relatively powerless farmer organizations who have limited bargaining power towards maize seed buyers. Additionally, transaction charges associated with third party arbitrage may be substantial compared with contract values (Deleruea and Ouedraogo, 2020). As a result, parties seeking to enter an agreement are typically forced to resort to informal/relational contracting as the later do not require third-party enforcement but are instead self-enforcing.

3.2.3 Inclusivity in decision making and leadership and farmer continued participation

Although the regression analysis presented insignificant relationship between inclusivity in decision making and farmer continued participation, the study further sort to establish farmer's perception regarding membership in farmer. Farmers who reported discontinued membership in groups gave a number of reasons for their decision. Among the reasons included poor group leadership at 17.2% and the feeling that the group no longer served the purpose it was intended at 7.5%. A number of farmers also reported that they are not adequately involved on matters group decision making with 75% feeling that it largely remained a reserve for group leaders. These results relate well with study by Isaboke (2021) who reported that by belonging to a group there was a 0.22% probability of reducing the adoption of Weather Index Insurance in Embu County. Additionally, 58.7% of the maize seed farmers in Baringo South reported that the farmer groups were mostly men-led, 2.6% as women-led and the remaining 39.6% indicated equal opportunity given. Gender equality as highlighted by the United Nations through the Sustainable Development Goal (SDG) number 5 is not only a fundamental human right but a necessary foundation for a peaceful and sustainable world. Perceptions about men's and women's leadership qualities as well as structural constraints on time and mobility tend to propel men into senior leadership and confine women to less strategic positions. According to Mucavi (2023), where women are supported to access climate-smart farming skills, access to credit, supported to formalize groups or cooperatives and receive productive assets, there has been a triple in household food security, improved family nutrition and income. It is estimated that if women had the same access to opportunities as men, the yields on their farms could increase by 20-30% (FAO, 2018).

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4. CONCLUSION

The study deduces that key components of farmer group dynamics have an impact on farmers' continued participation in the maize seed multiplication programme in Baringo South. The study concludes that farmer awareness on contractual arrangements have not been done consistently. It also implies that group leaders have not created opportunity adequate for members to engage on a regular basis with different stakeholders along the maize seed value chain thus limiting openness and connectivity that could enhance farmers' trust and willingness for continued participation. The study noted that most of the contractual arrangements are premised on trust relationship and thus need to be reviewed to formal legitimate structure to allow third party enforcement in the event disagreements arise. Ensuring that contractual farming arrangements with farmers are transparent and favorable to all parties concerned requires government regulation. Transparency and accountability of farmer group leaders to their members should remain the foundation for successful engagement in their group endeavors. Capacity building of farmers and particularly their group leaders on good governance and negotiation skills is critical in amplifying farmers' voices in decision making processes. This is because of the fundamental role farmer group leaders' play in linking farmers participating in the maize seed multiplication programme with the seed buying company and other service providers. These efforts will unlock the potential of smallholder farmers and promote sustainable agricultural growth and development.

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