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Sustainability of maize supply chains: The role of supplier development in the form of command farming in Mazowe district, Zimbabwe

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A B S T R A C T

The world is increasingly witnessing food insecurity and deteriorating individual and global livelihoods. This study sought to assess the effectiveness of contract farming in the form of command farming in achieving sustainability of maize supply chain in Zimbabwe. A descriptive approach was adopted where a sample of 35 agricultural experts were randomly selected to respond to questionnaires. The researchers also relied on interviews with farmers, the results of which were triangulated with quantitative data to improve the dependability of results. The study shows a positive and significant relationship between command farming and sustainability of the maize supply chain in Mazowe district of Zimbabwe. The study, therefore, recommends the government to invest more in command agriculture to improve productivity and sustainability in the maize sector. It further recommends investment in joint contract farming with agricultural firms and government to improve farming business to sustain the country's agricultural sector.

1. Introduction

Over the past years the world has witnessed increasing food insecurity and deteriorating individual and global livelihoods. Traditional agricultural practices, poor productivity coupled with a historical lack of investment in rural development, inequitable land tenure systems, and gender and income disparities have left 805 million people food insecure globally (FAO, 2014). In Sub-Saharan Africa, maize is one of the most widely consumed food items and is also considered an important source of livelihoods, nutrition, and food security (Galani, Orfila, & Gong, 2022). Economically sustainable food supply chains (FSCs) have been linked to the improvement in food accessibility and food security. New ways to achieve economic sustainability have now opened up through supplier development by procuring entities to improve their performance in the market (Job, 2015). Supplier development has been implemented widely in many developing countries (Tanzania, Zimbabwe) as a way to minimize risks, improving quality and output (Changalima, Ismail, & Mchopa, 2021; Mukucha & Chari, 2021; Arimond et al., 2011).

In Southern Africa region, supplier development has been prevalent in the agriculture sector (Mukucha & Chari, 2021) Poor performance in agriculture sector in many African countries has led many foods manufacturing buying firms to realize the importance of contract farming as a supply-chain management strategy to improve total output (Ncube, 2020). It has become a norm in the competitive world for farming to involve contracts of various types and modalities. Contract farming can transform agriculture through technology transfer, supported by effective extension services, input supply and credit systems to boost rural economies in Southern Africa (Scoones and Wolmer, 2003). In Zimbabwe, food insecurity has been attributed to traditional agricultural practices coupled with climate change, high food, and agricultural inputs prices due to economic meltdown, which lead to poor productivity. Lack of rural development investment also contributes to food insecurity in Zimbabwe (Nyahunda, & Tirivangasi 2019).

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Contract farming has been prevalent in Zimbabwe focused on export commodities such as cotton, tobacco, dairy and horticulture. It has replaced most of its own funding schemes (Scoones et al., 2018). After the land reforms of 2000, the Zimbabwean government funded agricultural production, especially of food grains through contract farming. Contract agriculture was implemented to reduce dependence on grain imports and international aid (Solidarity Peace Trust, 2006). The government of Zimbabwe introduced contract farming with the hope that it would help achieve some of the Sustainable Development Goals (SDGs), especially food security, poverty reduction and gender equity, through job creation and income generation (du Toit, 2019). Seventy percent of the country's population depend directly on the agriculture sector and the rest benefit indirectly in relation to food (Mutamba & Ajayi, 2018). Contract agriculture was first implemented in the 2005/2006 agricultural season to revive the tobacco, horticulture, and cotton sectors (Moyo & Nyoni, 2013). As a result, cotton growing was revitalized and tobacco farming saw a significant increase (Sachikonye, 2016; Masuka, 2012). In 2016/17 farming season, the Zimbabwe government initiated another contract-farming scheme, code-named Command Agriculture, to boost the production of maize in the country to substitute maize importation (Mazwi, Chemura & Mudimu, 2019). Despite the popularity of supplier development in different industries, it is to the best knowledge of these researchers that no research has empirically examined the effect of command farming on economic sustainability of maize supply chains in Zimbabwe. Based on the above the following research question arise:

RQ: How effective was command agriculture in ensuring economic sustainability of maize supply chains in Mazowe district of Zimbabwe?

The remainder of this article is structured as follows. Section 2 explores literature review. Based on the literature review, Section 3, describes research strategies and methods adopted by these researchers. Section 4 presents, interprets, and discusses the findings of the study. The final section depicts the conclusions and recommendations found in this study.

2. Literature review

This study is guided by the social capital theory. This section, therefore, presents the social capital theory before it presents related literature on supplier development.

2.1 Social Capital Theory

Social capital is defined as the total of the real and potential resources that are part of, accessible through, and derived from a person's or a group's network of relationships. (Jääskeläinen, Schiele, & Aarikka-Stenroos, 2020). Social capital is the norms and networks that allow people to work together (Portes, 1998). Organizations have different objectives and goals they want to achieve in a capitalistic society. Firms have realized that uniting efforts with like minded partners can increase efficiency than working in isolation (Job, 2015). Social capital has been adopted by academics in the 1990s to explain economic, business and social phenomena. The Social capital theory has been noted as suitable in explaining supplier development by procuring entities (Wu and. Chiu, 2018) The theory points-out the need for establishing a relationship between supplier and buyer to achieve joint benefits. For both firms to realize the common goals they must support each other. The buying firm commits its resources and knowledge to support suppliers to improve their performance in production and other activities so as to improve the quality of goods/services supplied to the procuring entity.

2.2 Risks in maize supply chain

Maize supply chain stretches from farmers, wholesalers, retailers or exporters, households, restaurants, and canteens (Kaminski, Elbehri, & Zoma, 2013; Bernard et al., 2013). After harvesting their maize, farming households normally store their food requirements for their own consumption. Any surplus is sold to formal markets, such as the Grain Marketing Board (GMB) in Zimbabwe, or through the informal sector. GMB is a state-owned enterprise, established primarily to guarantee an all-year-round competitive market for local maize producers. Most trade is on an informal basis (i.e., no written contracts, lack of access to information services and poor infrastructures). Most traders collect staples at the village gate and sell to wholesalers who operate in main and secondary markets. Large-scale trade also takes place at the regional level and at the national level with some cross-border traders. Retailers only sell a few tons a month and have small liquid funds for purchases. Their marketing outlets mostly concern terminal and urban consumers. A food supply chain (FSC) consists of all the stakeholders who participate in the coordinated production and value-adding activities that are needed to make food products. An economically sustainable food value chain is a food value chain that is profitable throughout all of its stages (Hidayati, Garnevska, & Childerhouse, 2021).

In a globalized economy where finalized products have components manufactured all over the world, effective management of supply chains is critical. When there is supply chain vulnerability, there will be a disruption in the supply chain as a result of the risk's adverse effects. Effective risk management is essential because modern global supply chains are dynamic (Wagner and Bode, 2009). Maize production and processing face many risks, resulting in food insecurity (United States Agency for International Development. 2003). Global risks are inevitable, unavoidable and evolve to become more prevalent with time. Poor grasp of hazards in the global maize supply chain will diminish maize production (Manuj, and Mentzer, 2008). Highly variable maize prices and volume, poor information flow, restricted access to credit, and inadequate and

substandard storage facilities are all constraints to the proper operation of the maize supply chain (United States Agency for International Development, 2003).

The maize industry in Zimbabwe counts on the global marketplace for its materials and inputs supplies (UN Office for the Coordination of Humanitarian Affairs, 2003). The causes of food insecurity in Zimbabwe are vast. According to ZIMVAC (2017), regularly occurring droughts have significantly compromised maize production in Zimbabwe, resulting in food deficits that now take place every two to three years in the drought prone districts. Climate change hazards are anticipated to be more intense in the future and the exposure to extreme weather, economic meltdown and increased population make developing countries like Zimbabwe more vulnerable (Brown et al., 2012).

With the increasing effects of climate change, economic shocks, volatile food prices and pressure on natural resources, there is a real risk of even more people sliding back into food insecurity (Masipa, 2017). Maize competes for inputs (notably fertilizer) with other cash crops such as cotton, sorghum, and peanuts (UN Office for the Coordination of Humanitarian Affairs, 2003).. Access to credit is also problematic when considering the few risk-mitigation strategies of rural entrepreneurs (Kaminski, Elbehri, & Zoma, 2013).

2.3 Supplier development

Supplier development is the way procuring entities work with certain suppliers to improve their performance for the benefit of the buying firm (The Chartered Institute of Purchasing and Supply, (CIPS), 2013). Supplier development can be a continuous activity which may take a long period of time to bring positive results, or it can be a one-off project. There are two types of supplier development which are indirect and direct supplier development (Wagner, 2006; Krause, 1999). Indirect supplier development process is when the buying organization commits limited resources to a supplier, there is no active involvement of the buying organization in the supplier operations and knowledge transfer from the buying organization does not exist. Whilst direct supplier development is the providing of financial capital, equipment on site consultation, education, and training programs to the supplier. All types of supplier development have an impact on the performance of buying organizations in relation to supply chain competitiveness (Li, Humphreys, Yeung. & Cheng. 2007). In agriculture supplier development is commonly referred to as contract farming. Contract farming has existed since time immemorial. In ancient Greece, China and in the United States, different forms of sharecropping agreements have been witnessed. In the twentieth century, European colonial powers established formal farmer-corporate agreements in their colonies. A notable example is the Gezira Irrigation Scheme in Sudan, where the government contracted resettled tenant farmers to grow cotton. The arrangement involved the Government to provide production support through, the supply of inputs and the provision of technical advice. The Zimbabwean version has been widely codenamed Command Agriculture by the government who initiated it.

Contract farming is an arrangement where farmers are provided with agricultural inputs, extension services and a guaranteed market on condition that they will supply their produce to the contractor who deducts the costs of goods and services and gives the farmer the difference. Command agriculture is a form of contract farming adopted by the Zimbabwe government as one of several strategies in its broad land reform policy framework. It was geared towards increasing cereal production to boost national food reserves. In the case of 2016/2017 agriculture season, targeted crops under command agriculture were maize and wheat (Mazwi, Chemura, Mudimu & Chambati, 2019). Cereal grains in human nutrition are widely recommended as they provide substantial amounts of energy and proteins to many people especially in developing countries (FAO, 2011). Zimbabwe is one of those developing countries whose population highly depends on these cereal grains for nutrition, one of which is maize. Maize is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally, maize is known as the queen of cereals because it has the highest genetic yield potential among the cereals (Arsode, Murali Krishna, Sunil, Sree, & Ravi Charan, 2017).

Command agriculture was adopted and implemented by the Zimbabwean government in order to curb the devastating effects of food insecurity. According to Mabhena (2013), the controversial Fast Track Land Reform Programme (FTLRP) stifled the use of agriculture as an economic engine in recent years in Zimbabwe. Mabhena (2013) reiterated that the government of Zimbabwe adopted and implemented Command Agriculture after realizing the menacing devastating drought of 2015 to 2016 farming season which brought the country to its knees after a perceived failed Fast Track Land Reform programme of the year 2000. Through Command Agriculture, the Zimbabwean Government provided agriculture input loans to farmers to produce specific crops aimed at lessening the burden of having to look for funds to buy farm inputs thereby improving maize production. (Mazwi, Chemura, Mudimu & Chambati, 2019). It was attractive to the farmers as the special seasonal loan facility attracted minimal interest rates and the repayment was in the form of produce. The new arrangement where repayment was in the form of part of the yield, was expected to enable farmers to have surplus for family consumption and market for income. Maize production is becoming more of a commercial activity, and more contracting arises exclusively among the stakeholders of the marketing channels (Mazwi, Chemura, Mudimu & Chambati, 2019).

2.4 Contract farming and agricultural supply chain sustainability

Sustainability focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs (Munyimi & Chari, 2018). In the agricultural supply chain, sustainability means avoidance of the depletion of natural resources in order to maintain an ecological balance. It is measured by non-depletion of land, avoiding land pollution, efficient use of water, land and natural resources. Performance indicators of agricultural supply chain sustainability include improved productivity (quality, quantity) farms and firms. Improved availability of inputs such as fertilizer and traction is expected to increase the area under cultivation as well as enhance yields (Okoboi Muwanga & Mwebaze, 2012). Even the potential yields, given the technology, should be quite high. Increased yields of maize for smallholder farmers, results in increased income and diet nutrition. Furthermore, improved yields enhance food security, enhanced livelihoods, enhanced nutrition and improved health (Kuhudzayi & Mattos, 2018). The availability of cheaper loans for farmers increases gross margins and gross profit (Kuhudzayi & Mattos, 2018; Williams, 2007). There is therefore a need to make the maize value chains in developing countries sustainable to meet the food security, livelihoods, and nutrition expectations. To meet these sustainability expectations the Zimbabwe government implemented contract farming with the hope to transform to meet maize supply chain sustainability. However, the effects of contract farming on the sustainability of maize supply chain in Zimbabwe have been insufficiently researched. To address this research gap, this study therefore sought to establish the effects of contract farming on sustainability of maize supply chains in Zimbabwe.

3. Methodology

The focus of this study was to explore the effectiveness of command farming in achieving resilience of the maize supply chain in Mazowe district of Zimbabwe. This study was guided by a pragmatist paradigm to interpret and give compelling explanations rather than empirical proof (Carcary, 2011). Consequently, a mixed research approach was used triangulating questionnaires with interviews to address the issue of biasness of one source of data (Jaffee, Siegel & Andrews, 2010). The researchers randomly sampled 35 out of 42 agriculture business experts from Grain Marketing Board (GMB) and agriculture extension officers from the Ministry of Agriculture in Mazowe district that had the potential to provide significant data on economic sustainability of maize supply chain in Zimbabwe (Kredjie & Morgan, 1970). The researchers also purposely sampled 15 farmers as key informants for individual in-depth interviews as farmers were in the best position to provide the best information about their experiences with contact farming. These researchers could not continue interviewing after interviewing 15 farmers, as they observed information saturation since all other farmers were saying the same things. The researchers informed the participants of the objectives of the research, and the significance of their responses, and in turn, the respondents and participants voluntarily agreed to participate. Participants were not forced to participate in the research process. Quantitative data were analyzed in STATA and presented in tables. Ordinary Least Squares (OLS), and OLOGIT and OPROBIT estimates were obtained from analysis of the questionnaires. OLOGIT and OPROBIT regression analysis were used to test for the robustness of the regression model. The researchers used expert opinions in developing the questionnaire to determine content validity (Yeşilyurt & Çapraz, 2018) while Cronbach's Alpha Coefficient confirmed the reliability of the instrument (Sürücü, & Maslakçı, 2020). Thematic data analysis was used to pinpoint, examine, and record patterns or themes from interviews, and results were presented in vignettes Interviews results were triangulated with questionnaire results establishing the reliability and validity of qualitative data (Golafshani, 2003).

4. Results and Discussion

These researchers sought to establish the effectiveness of supplier development in the form contract farming in ensuring economic sustainability of maize supply chains in Mazowe district of Zimbabwe. Table 1 shows the background characteristics of the agricultural experts that responded to our questionnaire.

Table 1
Background data

Demographic Variable	Variable	Frequency	Percentage	SD
Gender:	Male	26	74.29	0.500
	Female	09	25.71	0.500
Age:	≤30years	05	14.29	0.465
	31≤ age ≤40	08	22.86	0.687
	41≤ age ≤50	12	34.29	0.654
	51≤ age ≤60	08	22.86	0.538
	Age ≥61	02	05.71	0.644
Level of Education:	Diploma	13	37.14	0.612
	Undergraduate Degree	12	34.29	0.425
	Postgraduate degree	10	28.57	0.591
Experience of participation in	0≤ years ≤ 5	05	14.29	0.421
	6 ≤ years ≤ 10	07	20.00	0.224
	11 ≤ years ≤ 15	14	40.00	0.655
	Years ≥ 16	09	25.71	0.671

Source: Primary Data

According to Table 1, most of the respondents (74.29 %) were male while 25.71 % were female implying a male dominated agriculture profession. Table 1 also reveals that of all the respondents, only 14.29 % were 30 years and below implying an industry dominated by mature people. The study also reveals that all the respondents had at least attained a diploma qualification with 34.29 % having attained undergraduate qualifications and 28.57% had done postgraduate studies. The results indicate that a majority of respondent farmers (65.71%) have been in with the GMB or extension service for at least 11 years and are therefore considered to be experienced enough to provide the necessary technical advice in maize farming. The study sought to to examine the relationship between command agriculture practices and economic sustainability maize supply chain in Zimbabwe This objective was answered using multiple linear regression analysis. The model summary is illustrated in Table 2.

Table 2
OLS, OLOGIT and OPROBIT estimates: Command Agriculture Practices on maize supply chain resilience in Zimbabwe

	OLS	OLOGIT	OPROBIT
VARIABLES	(1)	(2)	(3)
Cheap loan schemes	.254***	.336***	.253***
	(0.312)	(0.365)	(0.265)
Education and training programs	.228**	.336**	.229**
	(0.385)	(0.365)	(0.247)
Extension services	.289**	.328**	.331**
	(0.327)	(0.378)	(0.423)
Provision of equipment	.001*	.134*	.001*
	(0.021)	(0.146)	(0.023)
Guaranteed market	.055***	.124***	.071***
	(0.052)	(0.132)	(0.073)
Constant cut1		11.87***	9.15***
		(3.343)	(2.870)
Constant cut2		16.45***	10.87***
		(3.628)	(2.181)
Constant	0.616		
	(0.679)		
Observations	35	35	35
R-squared	0.375	0.3127	0.2432

Robust standard errors in parentheses
*** p<0.01(Significant at 1%), ** p<0.05 (Significant at 5%), * p<0.1(Significant at 10%)
OLOGIT and OPROBIT regression analysis were used to test for the robustness of the model. The results did not change as confirmed by the OLOGIT and OPROBIT models in Column 2 and 3 of Table 2 respectively suggesting that the model is correctly specified.

Results from Column 1 Table 2 show a significant positive effect of cheap loan schemes on economic sustainability of the maize supply chain as shown by the beta coefficient of 0,254***. The results indicate that if loan availability is increased by one unit, there is a probability that the economic sustainability of maize increases by 25.4 % at the 1% level of significance. Interviews with farmers confirmed their reliance on government loans to sustain them in maize farming as one farmer said:

"Command agriculture provided us with affordable loans that I strongly believe have contributed to the sustainability of the maize industry in this country. After delivery of our maize to the GMB we were able to maintain and prepare our fields for the coming season and also pay taxes both for the crops and land, thus we need these cheap loans to sustain the maize supply chain" (A2 Farmer at Mazowe 13 March 2020)

In the same fashion, participants revealed that, due to command farming, they were able to increase in the land after maize cultivation and were able to increase production of maize beyond previous cropping seasons. One Communal farmer had this to say:

"Due to support, we got from the government, through loans we have done reasonably well. Most smallholder farmers produced more food than just for subsistence and have reinvested this in their farms." (Small scale Farmer, in Mazowe 15 April 2020)

The results are consistent with a study by Rehman, Jingdong, Du and Khatoon (2015) who found that countries with good banking systems that provide loans to farmers play an important role for the development of agriculture. Countries with banks that give different kinds of loan schemes and easy access to farmers applying for these have good agricultural sectors.

The results also reveal that education and training positively and significantly affect economic sustainability in the maize supply chain as shown in Column 1 of Table 2 where education and training has a coefficient of 0,228**. Table 2 shows that increasing education and training by one unit has a 22.8 % likelihood of improving economic sustainability of maize supply chain at 5 % level of significance The interviewees had the same sentiments as they responded that they were benefiting from agricultural field days done by agricultural extension officers to impart knowledge on sustaining maize supply. One A1 farmer said:

"Training helps us as farmers to incorporate the latest sustainable scientific advances and technology tools into our daily farming operations. By training we learn how to sustain our maize supply chain through reduced food contamination,

reduction of the need for water and chemicals for maize which will enable us to increase profits from our maize" (A1 Farmer at Mazowe 13 March 2020)

The results corroborate with Ahmad, Jadoon, Ahmad and Khan (2007) who found that as a result of the training crop yield increased, vegetables and fruits production has also shown an upward trend and diseases and mortality rate of the livestock has also decreased.

Results from Column 1 in Table 2 also reveal that extension services had a positive and significant impact on sustainability of the maize supply chain. According to Table 2, if extension services are increased, the economic sustainability of the maize supply chain increases by 0.289 points at 5 % level of significance. Interview results with farmers support quantitative results as most farmers agreed that they are sustaining their maize farming business through assistance from command agriculture programs as the Ministry of lands, agriculture, water and rural resettlement provided them with extension services. One farmer said:

"*We are benefiting from extension services provided by extension officers under command farming. They come from time to time to visit us, checking on challenges we are facing like pests and diseases. They regularly visit to offer us technical advice like advising on treatment to pests and diseases*" *(A2 Farmer at Mazowe 13 March 2020)*

Results agree with Morris, Tripp and Dankyi (1999) who found that the Ghana Grains Technical Training Project increased maize production for Ghanaian maize farmers.

The results from Column 1 in Table 2 further indicate farming equipment given to farmers positively and significantly influenced economic sustainability of the maize supply chain (b=0,001*). The results reveal that supplying farming equipment has a probability of improving economic sustainability of the maize supply chain by 0.1 % at 10 % level of significance. Farmers agreed in interviews that without farming equipment there is no way they were going to increase their maize productivity. Besides improving production efficiency, provision of agricultural equipment encourages large scale production and improves the quality of maize produce.

One farmer supported the positive effect of getting farming equipment as follows:

"*We planted at a time of our choice because we got equipment through command agriculture enabling us to continue sustaining our maize production. Some among us got tractors, disc harrows, and combine harvesters here in Mazowe. Some even got drip irrigation equipment and disc ploughs which enabled us to meet deadlines and not miss our planting dates" (Communal Farmer at Mazowe 13 March 2020)*

The result concurs with Schueller (2012) who found that use of proper equipment is very important for the efficient production of much needed food and fiber.

Similarly, Column 1, Table 2 results show that the availability of a ready market through Grain Marketing Board (GMB) had a positive and significant role on the sustainability of maize supply chain and that improved market availability improves economic sustainability by 5.5 % at 1 % level of significance. Those farmers who benefited from command agriculture were assured that GMB was going to buy their maize. The quantitative results corroborate with interview results from farmers where one farmer said:

"The maize supply chain has been viable here because as we harvested, we had a ready market for our maize. First, it avoids us selling our maize with poor prices to what we call makoronyera (unscrupulous people). Secondly, maize will not get bad before we sell it because as soon as we harvest the Grain Marketing Board (GMB) will be ready to receive our deliveries" (A1 Farmer at Mazowe 13 March 2020)

The results of Skjoldevald (2012) in Kenya supported this study results when it found that small scale farmers' access and participation in the formal maize market improved their revenue and production in future farming seasons.

5. Conclusions

This conclusion sets out the main policy considerations identified in this research, which should be considered when using different measures to promote sustainability of the maize supply chain. This overview indicates that cheap loan schemes enable farmers to pay for the maintenance of the field and taxes for the land. Furthermore, it has also recognized that an effective training and education program can be a crucial factor in addressing and enhancing the sustainability of the maize supply chain. The study has also confirmed the critical role of extension services in enhancing farm productivity and household income along maize supply chains. Sustainable agricultural equipment was also found to significantly contribute to the development of value chains and food systems as it has the potential to render postharvest, processing and marketing activities and functions more efficiently, and effectively, hence sustaining the maize supply chain. The study also concludes that guaranteed markets contribute positively to sustainability of the maize supply chain. If there is an assured market, the more viable the maize supply business.

6. Recommendations

The study findings have important policy implications for improving economic sustainability of maize supply chains in Zimbabwe. The study recommends Government and commercial agricultural banks to finance farmer's activities. The study found that farm cheap loan schemes can economically sustain the maize supply chain. Farmers are recommended to farmer groups such as farmer-based organizations for easy access to agricultural extension service. The study further recommends the agricultural ministry produce training, to empower farmers to carry out their farming activities to the highest standards and deliver high quality maize. Furthermore, the study recommends that agricultural extension service delivery should be boosted to reach every maize farmer in the country. Provision of agricultural equipment to maize farmers has proved to be important and is recommended in sustaining the maize supply chain. The study suggests that further research should be done on the impact of command agriculture on other farm crops in order to determine the actual impact of command agriculture on the entire agricultural industry of Zimbabwe.

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Appendix 1

QUESTIONNAIRE

Instructions: Below is a list of statements related to available command agriculture practices practiced in Zimbabwe in maize farming. Please rate the extent you agree or disagree the extent to which the following command agriculture practices were used on you in maize by placing a check mark in the appropriate box.

Strongly agree

Agree

Uncertain

Disagree

Strongly Disagree

Section A: **Available supplier development in enhancing the sustainability of maize farming and marketing**		Strongly agree **5**	Agree **4**	Uncertain **3**	Disagree **2**	Strongly Disagree **1**
1.	Provision of cheap loan schemes	1	2	3	4	5
2.	Education and training programs	1	2	3	4	5
3.	Extension services	1	2	3	4	5
4.	Provision of equipment	1	2	3	4	5
5.	Guaranteed market	1	2	3	4	5
6.	Provision of inputs	1	2	3	4	5

Section B: Impact of command agriculture on sustainability of maize supply chain		**Strongly agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
7.	Generation of adequate capital	1	2	3	4	5
8.	Increased capacity to pay taxes and other government fees	1	2	3	4	5
9.	Increased ability to pay suppliers and other contractors	1	2	3	4	5
10.	Enhanced capacity to pay salaries	1	2	3	4	5
11.	Financial sustainability	1	2	3	4	5
12.	Improved quality of maize					
13.	Improved yield of maize	1	2	3	4	5
14.	Improved income for the farmers	1	2	3	4	5
15.	Growth and sustainability of farmer's business	1	2	3	4	5

Section D: Demographic Data

Gender

Male	01
Female	02

How old are you?

≤30years	01
31≤ age ≤40	02
41≤ age ≤50	03
51≤ age ≤60	04
Age ≥61	05

Level of Education

Diploma	01
Undergraduate Degree	02
Post graduate Degree	03

Experience in maize supply chain

0–5 years	01
6–10 years	02
11–15 years	03
16 and above	04

Appendix 2

INTERVIEW GUIDE

SECTION A:

1. Which Command agriculture assistance did you receive from government for maize farming and marketing?

PROBE: Provision of inputs; guaranteed market; extension services (technical support); training; provision of necessary infrastructure.

SECTION B:

2. What impact had command agriculture on sustainability of maize supply chain since its adoption?

PROBE: Financial suitability of farmer, income generation, ability to pay taxes and salaries; investing in other crops, livelihoods of farmers, social standing in community, ability to sustain basic needs.