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An assessment of differential supplier category performance in the agro processing industry: A case for supplier development in the Zimbabwean tobacco industry

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A B S T R A C T

This study sought to determine whether farm categories influence the key agro business supply chain metric of crop yield. The investigated farm categories are the communal farms, A1 farms, A2 farms, and commercial farms that reflect the agricultural structure that emerged from the post-fast-track land reform programme in Zimbabwe. Secondary data for crop yield was collected from the Tobacco Industry and Marketing Board publications of a five-year period spanning from 2014-2018. Tobacco Industry and Marketing Board is the regulatory authority of the Zimbabwean tobacco industry. The study used One-way ANOVA to test the specified hypotheses. A post hoc test was conducted using the Bonferroni procedure. The results indicated that crop yield is a function of the farm category. Communal farms had low crop yield, while A1 farm models proved to be very productive as evidenced by higher crop yield than any other farm category. A2 farms and commercial farms had unexpectedly low crop yield. The study recommended consolidation and transformation of communal areas into small-to-medium plots for the purposes of improving their agricultural viability, while at the same time downsizing the redundant A2 and commercial farms into small scale plots for the purposes of improving their efficiency. The study also recommended entering into resource-providing contract farming with A2 farmers whose current low yield might be due to lack of adequate input resources.

1. Introduction

The Zimbabwean economy leverages on the vibrant agricultural sector which provides over 60% of the raw materials needed by the agro-processing firms (FAO, 2021). Agro processing firms in Zimbabwe that are not vertically integrated rely on sourcing their raw materials from several farm categories. Even the vertically integrated monopsonistic firms such as Tongaat Huletts Corporation in the sugar processing industry and Tanganda Limited in the tea processing industry usually supplement their supply of raw materials through sourcing from both independent and contract farmers in various farm categories (Chambati, Mazwi & Mberi, 2018). Dealing with different farm categories, despite spreading the supply risk, has some monumental challenges of widening the supply base. A supply base is a segment of the entire supply network that a merchant controls (Lysons & Farrington, 2020). A wide supply base misses out on the benefits of supply base optimisation such as supplier development (Mukucha & Chari, 2021). It is therefore imperative to have a closer analysis of the performance of various farm categories involved in strategic crops such as maize (Mazwi, Chemura, Mudimu & Chambati, 2019) and tobacco (Prowse & Perez Nino, 2022) as part of strategic sourcing (Mukucha & Chari, 2023). More so, supplier performance evaluation is a necessity for developing suppliers with the potential to improve productivity (Aydas, Ross, Parker & Alavi, 2023; Benton, 2014).

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In Zimbabwe the farmers that supply agro processing industries are found in either of the following farm categories: communal, A1, A2, and commercial farm groups (Mazwi *et al*., 2019). This structure came into existence at the turn of this millennium following the implementation of the Fast Track Land Reform Programme (FTLRP) (Moyo, 2011) that leveraged on the Land Acquisition Act of 2002 (Mkodzongi & Lawrence, 2019). Land reform is a process of granting land access to the marginalised populace so that they can also participate in commercial agricultural production activities (Posterman & Hanstad, 2005). Prior to the implementation of the FTLRP the agrarian structure was bi-modal consisting of communal farms where land rights are vested in traditional leaders, and commercial farms where farmers had a freehold land tenure (Moyo & Chambati, 2013). The FTLRP added A1, and A2 models on top of the existing communal and commercial farm models (Mkodzongi & Lawrence, 2019). The A1 model was adopted by the landless peasants as a result of the need to decongest the communal areas (Shonhe, Scoones & Murimbarimba, 2021). A2 farm models were extended to the well-resourced elites who had the potential to turn farming into a lucrative business (Mkodzongi & Lawrence, 2019). Some commercial farms post the FTRRP were reduced in size and currently average around 700 hectares of land (Moyo, 2011). Their ownership comprises the few original commercial farms which were spared from the land redistribution exercise and the new elite beneficiaries of the FTLRP (Shonhe & Scoones, 2022).

In Zimbabwe one of the crops that are grown in all the farm categories is tobacco. Tobacco farming is one of the most vibrant and resilient agricultural activities in the Zimbabwean economy (Fang, De Souza, Smith & Lee, 2020), and it contributes to almost 10% of the country's GDP (Chingosho, Dare & Walbeck, 2020). Through the years tobacco has remained the most lucrative crop (Scoones, Mavedzenge, Murimbarimba & Sukume, 2018), and the country's top foreign currency generator after gold (Mazwi, Chambati & Mutodi, 2018; Masvongo et al., 2013). It is believed that tobacco is more than six times more lucrative than most crops that are grown on a commercial basis (Leaver, 2004). In terms of world rankings Zimbabwe is one of the top tobacco producers alongside the international giants such as China, Brazil, and the United States of America (USA), and the regional performers like Malawi and Tanzania (Scoones *et al*., 2018). Furthermore, Zimbabwe is among the top three tobacco exporters ahead of the internationally acclaimed agricultural giants such as China, Brazil and the USA (Ortiz, 2011). The bulk of the tobacco grown in Zimbabwe is meant for export, while the remainder is reserved for value addition locally by an oligopoly of local tobacco processing firms (Tausha & Zengeni, 2007; Sakata et al., 2022). There are four tobacco processing firms operating in Zimbabwe. The locally value-added tobacco is entirely exported by three firms and the other firm directs its entire output to meet local demand.

Tobacco merchants are interested in the sustained supply of leaf tobacco for processing since their capacity and demand always outstrip supply (Mazwi *et al*., 2018). Therefore, as part of strategic sourcing tobacco merchants are interested in finding the farm categories that have the potential to meet most of their supply chain metrics such as yield. The question of whether all the farm categories involved in tobacco farming have the same crop yield has never been adequately addressed in the extant literature. This is surprising considering that international sourcing best practices require procurement practitioners to find the best source of supplies and develop appropriate buyer-supplier relationships that may culminate in supplier development in the form of contract farming (Chari, et al, 2023). Therefore, this study seeks to fill in this important research gap whose findings would assist agro-processing firms to identify, locate, assess, and secure the best sources of raw materials. The farms that grow tobacco shall be assessed for the purposes of coming up with answers to the research question in this study.

The rest of the study is organised as follows: section 2 comprises relevant literature with arguments that culminate in the specification of the relevant hypothesis, section 3 outlines the methodology that was followed in order to test the hypothesis and answer the research question. Section four elaborates the analysis and interpretation of the results. Section five provides a discussion of the results in the context of what is already recorded in the extant literature. The last section presents some conclusions reached, limitations associated with this study, and the suggested future research agenda.

2. Literature review

Sourcing refers to the process of finding suppliers of materials (Lysons & Farrington, 2020) needed for executing an organisation's operations with the view of leveraging targeted spend across functional departments (Engel, 2004). Strategic sourcing is accomplished through advanced sourcing analytics, supply market analysis, and supplier performance evaluation (Wisner, Tan & Leong, 2016). The end result of strategic sourcing is procurement from the identified sources (Johnson, Howard & Miemczky, 2014). Strategic sourcing enables supplier base optimisation, supplier development, and improvement of buyer-supplier relationship (Cousins, 1999). More specifically, strategic sourcing enables the identification and selection of competent suppliers (Lysons & Farrington, 2020). Through strategic sourcing firms can reduce their total cost of ownership and improve the quality of sourced materials (Mukucha & Chari, 2021). Sourcing in the agro processing industry emphasises on various supplier performance metrics (Chopra, Meindl, & Kalra, 2018) such as crop yield, purchase price, crop quality, and delivery timing (Mukucha & Chari, 2021). This study will focus on crop yield which is widely emphasised in the agribusiness in general and tobacco industry (Shonhe & Scoones, 2022).

Crop yield is measured by output in kilograms per tilled hectare (Mazwi *et al*., 2020). Agro processing merchants are primarily concerned with an increase in the quantity and quality of procured raw materials in the form of harvested crops

(Mutambara & Mujeyi, 2020). This need for adequate volumes to increase capacity utilisation leads to the concerns with the farmers' productivity in terms of yield (Mutambara & Mujeyi, 2021). Furthermore, crop yield is particularly important for those merchants that seek to recruit farmers for supplier development in the form of contract farming. There are several factors that determine the yield of crops planted and harvested in a piece of land such as soil quality, adequacy and quality of inputs, conduciveness of climate, agronomic practices followed, levels of contracted farmers' education, and availability of labour (Mutambara & Mujeyi, 2021; Ruml & Qaim, 2020; Kumirai *et al*., 2018; Buka, 2017). These factors interact with farm sizes and structures such as Communal, A1, A2, and Commercial, in order to determine yield.

3. Hypothesis development

It is expected that the yield from the four farm categories that characterises the Zimbabwean agrarian structure varies. The differentiation in yield is grounded in the Resource Based Viewed (RBV) theory. The RBV theory was propounded by Barney (1991) and it states that firms attain competitive advantage as a result of possessing unique resources and capabilities (Alvarez and Busenitz, 2001; Alvarez and Barney, 2000) that are not easily imitable in the short run (Barney, Ketchen, & Wright, 2011). Considering that the contemporary nature of competition is no longer limited to individual firms, but supply chains (Coyle, Langley Jr, Novack & Gibson, 2021), agri-processing firms must evaluate the capabilities of the suppliers. With this in mind there is a need to consider the differential potential of different farm categories on the basis of the resources at their disposal. More specifically, these resources include, but are not limited to, soil quality on a piece of land, and agronomic practices followed, since these resources vary from one farm category to another (Shonhe and Scoones, 2023).

Yield for communal farmers is expected to be the lowest among the four farm categories. This suggestion is based on the fact that communal lands are historically associated with poor soil quality as a result of inferior soil structure and depleted soil nutrients (Shonhe & Scoones, 2022). These soils have absolutely poor agricultural potential (Dore, 2009). Furthermore, most of the communal areas are located in natural ecological regions IV and V of Zimbabwe where annual rainfall patterns are below 300mm. Moreover, communal farmers inherently lack sound agronomic practices which are needed for achieving acceptable yield (Shonhe & Scoones, 2022). Thus, communal farmers are also poorly resourced resulting in them using inadequate input resources (Mazwi, Chemura, Mudimu & Chamabti, 2019). Even in cases where they are provided with resources, they have a tendency to divert resources to non-contracted crops such as cereals in order to improve their household food security or liquidate the resources in order to finance their upkeep (Shonhe & Scoones, 2022).

A1 farms are expected to have the second lowest yield among the four farm categories. Their yield is expected to be slightly above that of communal farms on the basis that they are located in areas with good soil quality (Chingosho, Dare & Walbeek, 2021) and some of the farm owners are former employees of large commercial farms who have vast experience in conducting farming activities, although their experience is at the operational than the strategic level (Moyo, 2011). However, their yield is still expected to be lower than that of A2 farms and commercial farms since they carry with them a background of being poorly resourced, practice monoculture due to limited land spaces, and are bereft of sound agronomic practices (Mazhahwidza & Manjengwa, 2011; Moyo, 2004). Furthermore, most of these farmers, unlike A2 farmers, inherited the parts of the commercial land that had no existing farm infrastructure (Moyo, 2011).

A2 farm models are a special form of medium scale farms that are occupied by resettled elite farmers who have adequate or access to adequate resources to finance their farming operations (Mazwi *et al*., 2019). Recently, A2 farmers started to receive 99-year leases which enabled them to secure finances for their farming operations from financial institutions (Shonhe & Scoones, 2021). Moreover, A2 model farmers are highly exposed to and are generally appreciative of sound agronomic practices, and due to their larger land sizes, they can also practice crop rotation (Shonhe & Scoones, 2021). Additionally, most of the A2 model farmers inherited the existing farming infrastructure from the previously dispossessed commercial farmers (Mazwi *et al*., 2019; Moyo, 2011). Furthermore, some of the A2 model farmers hired the experienced former landowners and former farm workers as managers (Chambati *et al*., 2017; Moyo, 2011). Therefore, the yield for A2 model farms is expected to be higher than that of smallholder farms in the form of communal and A1 farms.

Commercial farms conduct large scale farming and historically occupied prime land that is fertile and suitable for growth of most crops (Shonhe *et al*., 2021). Most of the commercial farms are located in natural ecological regions I and II which receive an average annual rainfall of 1050 mm and above, and 700-1050 mm respectively (Dore, 2009). More so, commercial farmers are highly exposed to sound agronomic practice literature that enables them to attain good yields in line with the international best practices. Furthermore, commercial farms have access to various forms of financing due to their possession of various means of collateral (Chingosho *et al*., 2021; Kotler & Keller, 2016). As a result, commercial farms are characterised by high agricultural output (Shonhe *et al*., 2021) emanating from the above-mentioned key features coupled with the economies of scale obtained from large scale operations. It is therefore expected that commercial farms have higher yield than that of all other farm categories, followed by A2 farms, A1 farms, and then lastly communal farms. Several factors already discussed above such as land size, and the nature of related farmers' disposition account for the hypothesised differences. Based on the arguments raised above it is hypothesised that:

H_1: *There are statistically significant differences in crop yield of different farm categories.*

The reviewed literature leads to the conceptualisation of the model shown in the figure below.

Fig. 1. Yield conceptual model

The conceptual model suggests that as one moves from the lowest farm model in terms of land size, farm yield also increases. This suggestion contrasts with the widely accepted conceptual view that productivity falls as farm sizes increase on the basis that there is efficient utilisation of resources in small farms (Bernstein, 2009; Chayanov, 1966). The next section will outline the procedures followed in making comparisons of supply sources for the tobacco processing industries in terms of crop yield.

4. Methodology

4.1 Sample characteristics and data collection procedures

The data used in this study was hard figures extracted from the annual publications of the Tobacco Industry and Marketing Board (TIMB). The sampled data spanned for a six-year period ranging from 2014 to 2018. TIMB is a regulatory authority in the tobacco industry that was incorporated through the Tobacco Marketing and Levy Act [Chapter 18:20]. Its functions among others include controlling, regulating and collating statistics related to the production and marketing of tobacco in Zimbabwe.

4.2 Data analysis procedures

Data analysis was conducted using One-way Analysis of Variance (ANOVA) through the Statistical Package for Social Scientists (SPSS). One-way ANOVA is a statistical tool used to model a single metric dependent variable with a single categorical predictor variable (Field, 2018). The independent variable in this study was the farm category comprising four farm types: Communal, A1, A2, and commercial. The dependent variable was crop yield measured in kilograms per hectare. One-way ANOVA is associated with some assumptions that make its results valid (Field, 2018). These assumptions are categorised into two groups: design, and statistical. The design assumptions of One-way ANOVA are that the dependent variable must be continuous, and the independent variable must be categorical (Tabachnick & Fidell, 2013; Grimm, & Yarnold, 1995). The variables were operationalised in a manner that meets these two assumptions at the conceptualisation phase. The dependent variable is indeed metric, and the independent variable of the farm category is categorical. The statistical assumptions of One-way ANOVA are discussed and tested under the results section (Mahapatra et al., 2017).

5. Results

The hypothesis suggested that there are statistically significant differences in crop yield obtained by different farm categories and was tested using One-way ANOVA. Prior to analysing the results, a set of ANOVA statistical assumptions were assessed. These assumptions are normality and homoscedasticity (Field, 2018). Univariate normality was assessed using the Shapiro-Wilk test and the results are shown in Table 1.

Table 1
Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Farmer Category	Statistic	df	Sig.	Statistic	df	Sig.
Crop Yield	Communal farmers	.296	5	.175	.923	5	.548
	A1 farmers	.296	5	.174	.899	5	.404
	A2 farmers	.168	5	.200*	.974	5	.901
	Commercial farmers	.259	5	.200*	.938	5	.654

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The Shapiro-Wilk test indicated that the dependent variable was approximately normally distributed in all the farm categories, $p>.05$. Having satisfied the normality assumption, the next assumption tested was homoscedasticity. This was assessed

through using the Levine's test of equality on the default hypothesis that the error variance of crop yield is equal across all the four farm categories found in Zimbabwe. The results are shown in Table 2.

Table 2
Levene's Test of Equality of Error Variances

		Levene Statistic	df1	df2	Sig.
Crop Yield	Based on Mean	2.243	3	16	.123
	Based on Median	2.239	3	16	.123
	Based on trimmed mean	2.312	3	16	.115

The results shown in Table 2 indicated that there is an equality of variance for the dependent variable across all the categories of the independent variable as indicated by an insignificant *p* value of .123. Having satisfied the statistical assumptions, the study proceeded to report the results. The hypothesis testing results are shown in Table 4 and supported with the descriptive statistics in Table 3.

Table 3
Descriptive Statistics

Dependent Variable: Crop Yield

Farmer Category	Mean	Std. Deviation	N
Communal farmers	1395.00	99.154	5
A1 farmers	2394.60	276.334	5
A2 farmers	1432.60	260.168	5
Commercial farmers	1857.60	42.665	5
Total	1769.95	452.136	20

Table 4
Hypothesis testing results

Source	Df	F	Sig.	Partial Eta Squared	Observed Power
Intercept	1	1609.626	.000	.990	1.000
Farmer Category	3	27.928	.000	.840	1.000
Error	16				
Total	20				

The results demonstrated that there was sufficient evidence to reject the equal crop yield null hypothesis, $F(3,20) = 27.928$, $p<.001$, partial $\eta^2 = .840$, observed power = 1.000, and accept the alternative hypothesis. The effect size was large. The strength of the relationship between farm category and crop yield was strong, with the type of farm category accounting for 84% of the variance of the dependent variable. The observed power of 100 indicated that there was a 100% chance that the results could have come out significant. The acceptance of the alternative hypothesis prompted the need for post hoc tests. Post hoc tests were conducted using the Bonferroni procedure or correction. The Bonferroni procedure retains its statistical power where several analyses are run simultaneously (Levine, 2014). The multiple comparison results are shown in Table 5.

Table 5
Multiple Comparisons

Dependent Variable: Crop Yield

Bonferroni

		Mean Difference			95% Confidence Interval	
(I) Farmer Category	(J) Farmer Category	(I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
Communal farms	A1 farms	-999.60*	124.780	.000	-1374.98	-624.22
	A2 farms	-37.60	124.780	1.000	-412.98	337.78
	Commercial farms	-462.60*	124.780	.011	-837.98	-87.22
A1 farms	Communal farms	999.60*	124.780	.000	624.22	1374.98
	A2 farms	962.00*	124.780	.000	586.62	1337.38
	Commercial farms	537.00*	124.780	.003	161.62	912.38
A2 farms	Communal farms	37.60	124.780	1.000	-337.78	412.98
	A1 farms	-962.00*	124.780	.000	-1337.38	-586.62
	Commercial farms	-425.00*	124.780	.022	-800.38	-49.62
Commercial farms	Communal farms	462.60*	124.780	.011	87.22	837.98
	A1 farms	-537.00*	124.780	.003	-912.38	-161.62
	A2 farms	425.00*	124.780	.022	49.62	800.38

Post hoc tests using the Bonferroni indicated that the yield per hectare obtained by communal farms (M=1395.00, SD=99.15) was statistically different from that of A1 farms (M=2394.60, SD=276.33), p<.001, 95% CI [-1374.98, -642.22], and commercial farmers (M=1857.60, SD=42.67), p=.009, 95% CI [-837.98, -87.22], but were not significantly different from A2 farms (M=1432.60, SD=260.17), p= 1.00, 95% CI [-394.60, 319.40]. A1 farms (M=2394.60, SD=276.33) had yield that was statistically significantly different from A2 farms (M=1432.60, SD=260.17), p=.000, 95% CI [586.62, 1337.38], and commercial farms (M=1857.60, SD=42.67), p=.003, 95% CI [161.62, 912.38]. A2 farms (M=1432.60, SD=260.17) had yield that was statistically significant from that of commercial farms (M=1432.60, SD=260.17), p=.017, 95% CI [-800.38, 49.62].

6. Discussion

The disparities in yield of various farm categories were observed in this study. The yield for communal tobacco farms was found to be very low. This could be because there is continual subdivision of land to cater for the ever-burgeoning population (Dore, 2009). This effectively reduces the potential for achieving economies of scale. Moreover, overpopulation in communal areas has been associated with land deforestation, siltation of water sources, and overgrazing which all lead to poor soil structure that cannot sustain high yield for most crops (Shonhe & Scoones, 2022). Thus, historically communal lands were excluded from the mainstream agricultural activities on the basis that they are not fit for commercial agriculture (Scoons *et al*, 2018). The best that can come out of communal lands is subsistence farming (Shonhe & Scoones, 2022). Therefore, the fact that their yield was found to be the lowest conformed to the hypothesised direction. The disparities in yield among different farm categories have been noted in previous research. A study by Mazwi *et al*. (2019) revealed that maize productivity for communal farms was the lowest when compared to other farm categories.

A1 farms proved to be the best source of materials in terms of yield. A1 farms had the highest yield of tobacco produce per hectare. These findings are reflected in other crops such as maize. In a study by Mazwi *et al*. (2019) A1 farms had the highest maize yield than all other farm categories. This is surprising considering that most of the beneficiaries of A1 farm models were mainly landless peasants from communal areas and squatters from urban areas who invaded commercial farms and engaged in farming activities without any significant financial support from financial institutions or prior commercial farming experience (Shonhe *et al*., 2021). This demonstrates that smallholder farmers can perform exceedingly well if they are given access to productive land and other necessary support (Scoones & Murimbarimba, 2021). It seems that the landless peasants who availed themselves for the A1 resettlement programme considered farming as a serious business (Shonhe, Scoones, Mutyasira & Murimbarimba, 2022). This is much unlike the A2 land beneficiaries who were simply driven by a selfish desire to own land without having the passion to use it productively (Shonhe & Scoones, 2021).

The yield from A2 farms was lower than expected. It has already been mentioned that the yield of A2 farms was expected to be higher than that of communal farms and A1 farms on the basis of good soil structure, and access to agricultural input resources (Shonhe & Scoones, 2022). However, the lower yields from A2 farms revealed in this empirical study can be accounted for by lack of managerial skills. Most of the A2 farmers are the elite who took farming as an extracurricular activity since most of the beneficiaries of A2 farms are middle class citizens comprising of professionals in private practice, senior civil servants, and politicians (Shonhe *et al*., 2021; Moyo & Chambati, 2013). These farmers are full-time professionals in the private sector and government departments in urban areas. They only visit their farms during the weekends and public holidays (Shonhe *et al*., 2021). Most of the times they leave their farms in the custody of theory X type of employees whose work rate is pathetic. McGregor's (1960) theory X states that employees are generally lazy and avoid work whenever it is possible for them to do so. Moreover, Shonhe *et al*. (2021) observed that most of the A2 land beneficiaries are now old to the extent that they can no longer cope up with the strenuous demands of medium scale farming.

The underperformance of A2 farms is a cause of concern, despite some academics (e.g., Shonhe *et al*., 2021) expressing higher levels of optimism about the potential for success of A2 as medium scale farms. It is this farmer group that has created fertile grounds for discrediting the otherwise noble FTLRP. The underperformance of A2 farmers is attributed to several factors such as that these farmers shun agricultural extension services that are offered to them (Mazwi *et al*., 2019). Mazwi *et al*. (2019) further validly speculated that A2 farmers cultivate larger pieces of land which they cannot manage leading to low yield per hectare. This leads to the suggestion that A2 farms should be downsized as is the trend across Africa especially in Ghana and Zambia (Jayne, et al., 2016; Sitko & Chamberlin, 2015).

The results indicated that the crop yield from commercial farms was higher than that of communal and A2 farms as per expectations. However, the yield for commercial farms was lower than that of A1 farms contrary to the expectations. This perhaps is due to the fact that the agrarian reforms that have been taking place since the year 2000 has destabilized the farming operations in commercial farms through farm size reductions and rapid changes in farm ownerships (Scoones, 2022). The reductions in farm sizes affected the economies of scale associated with large scale operations, and changes in ownership had its productivity affected by the learning curve.

7. Conclusions, limitations, and future research agenda

The study was confined to the publicly available data for crop yield, which was published by the regulatory authority, TIMB. However, there are other important supply chain metrics such as crop quality, and delivery timing which this study did not cover due to limited availability of secondary data. It is therefore recommended that the future studies should seek primary data for crop quality and delivery timing and assess it in terms of the farm categories available in the Zimbabwean agricultural sector. Other equally important metrics such as buyer-seller relationships in the form of trust, collaboration, and information sharing should also be investigated within the context of agribusiness supply chains.

It is recommended in this study that agro processing firms must source from highly productive A1 farmers. A1 farms are smallholder farms that are in areas full of agriculturally productive land (Mazwi *et al*., 2018). However, the challenge with sourcing from A1 farms is that the supply base is too wide. A wider supplier base is associated with high transaction costs (Lysons & Farrington, 2020) and less or ineffective monitoring of quality production of crops. Therefore, the best way of sourcing from A1 farms is through contract farming or the introduction of order consolidation middlemen (Mukucha & Chari, 2023).

Traditionally contract farming excluded the poorly resourced communal farmers who lacked asset ownership (Shonhe & Scoones, 2022). Ironically, this study makes the recommendation along this line of thinking. Communal farms have got low yield due to several reasons that have been extensively discussed in this study, and therefore developing them through contract farming makes little economic sense. It is therefore recommended that communal areas must be converted into plots through land consolidation to make farmers increase their yield through economies of scale. When plots are too small as is the case with communal areas, more emphasis is placed on subsistence farming, thereby jeopardising productivity of cash crops such as tobacco (Dore, 2009). Farm consolidation is already prevalent in other developing countries such as Ghana, Malawi and Tanzania (Munyanga *et al*., 2019; Hal *et al*., 2017; Anseeuw *et al*., 2016). More specifically, the communal areas must be decongested through promoting rural-urban migration. This would leave some swaths of land unoccupied and hence free for consolidation into the sizable plots. At the same time, A2 farms and commercial farms which previous research has already indicated that they have a lot of idle land should be subdivided into the land sizes slightly larger than A1 plots. This would create land sizes that are manageable, hence increasing productivity levels.

Medium scale farms (A2) are relatively large enough to present opportunities for employment of sound agronomic practices and use of modern farming technology. In fact, the medium scale farms have become the backbone of the agricultural economy in developing countries such as Ghana, and Zambia (Shonhe *et al*., 2020). Moreover, medium scale farmers have got excess land which is largely unutilised (Moyo, 2011). These farmers are therefore few in numbers but have got a large swath of underutilised land (Mkodzongi & Lawrence, 2019) which can be utilised through supplier development in the form of contract farming (Mukucha & Chari, 2021). Contract farming has got a lot of advantages such as transferring production risks to the farmers (Mukucha & Chari, 2022), and accessing the use of land which is largely politicised in most developing countries (Mkodzongi & Lawrence, 2019; Mazwi *et al*., 2018). Furthermore, A2 farms may benefit from contract farming since most of such agreements are accompanied by agricultural extension services that are dedicated to specific farmer groups. Previous research has already shown that productivity tends to increase as a result of accessing agricultural extension services (Paltasingh & Goyari, 2018).

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Appendix

Yield statistics

Year	Communal farms	A1 farms	A2 farms	Commercial farms
2014	1395	2395	1433	1858
2015	1280	2561	1137	1919
2016	1396	1949	1242	1799
2017	1353	2392	1555	1850
2018	1551	2676	1796	1862

Source: TIMB (2018)