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# An assessment of supplier development in the Zimbabwean cotton industry

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**ABSTRACT**

Supplier development in the form of contract farming has become the main sourcing strategy in agro-processing industry. However, it is not yet clear from the extant literature how investments in contract farming contribute towards yield per yield. More specifically, this study sought to determine the effects of supplier development in contract farming investments on cotton yield in kilograms per hectare. It furthermore, seeks to unravel whether contract farming initiatives lead to the yield that exceeds 2000 kg/hectare as specified by the Zimbabwe regulatory authority's target. The study uses secondary data obtained on average national cotton contact farming investments per hectare in monetary terms. The output yield per hectare is obtainable from several publications by the Agricultural Marketing Authority (AMA). The statistics cover the period between year 2011 and 2016. Statistical data analysis of the study is accessed through the Statistical Package for Social Scientists (SPSS) using simple linear regression for the first hypothesis, and One-sample *t*-test for the second hypothesis. Supplier development initiatives' impact on yield is found to be statistically significant indicating that for every one unit increase in dollar investments yield changes by 1.161 kg of harvested cotton seed. The results also show that the mean cotton yield in kg/hectare is by far below the national set target of two thousand (2000) kg/hactare. The study recommends that the levels of investments ought to be increased in order to impact positively on yield in order to attain the desired yield per hectare.

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## 1. Introduction

Cotton is a drought-resistant crop that is grown in most arid and semi-arid areas in Zimbabwe where there is marginal rainfall (Kumirai et al., 2018). The same source insists that, Zimbabwe is the sixth largest cotton producer in Africa after Burkina Faso, Tanzania, Mali, Benin and Zambia. In Zimbabwe cotton farming is conducted by over two hundred thousand (200,000) smallholder farmers. Furthermore, cotton growing in Zimbabwe, qualifies as the second highest export earner after tobacco. Cotton contributes close to 10% of the Gross Domestic Product (GDP) (Mutambara & Mugeyi, 2021). The crop is more important in the agro-processing industry for its value chain processes that involve the sustenance of various downstream industries, such as the textile, ginning, spinning and weaving trades (Buka, 2016). Cotton further plays a significant role in import substitution of raw materials for the production of cooking oil and detergents (Parkash et al., 2023; Zia et al., 2022; Sarwar & Iqbal, 2020). Ginned seed cotton produces lint which is turned into yarn and textile (Buka, 2017). Yarn and textile can be processed into household products, such as sheets, towels, linen, bedspreads, curtains and clothing (Buka, 2016). Lint is also used in the manufacturing of industrial products, such as tyres, tents, bags, ropes and bandages. The stalks that are a residue from seed cotton serve as stock feed, composite manure, firewood substitute or raw materials for the manufacturing of corrugated boxes (Nkomo et al., 2016; Shaikh et al., 2003).

Since the turn of the millennium the cotton industry is constantly facing a severe down turn that is affecting several downstream industries in the Zimbabwe (Mutambara & Mujeyi, 2021). Open market

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procurement could no longer sustain the required quantities by the cotton merchants. In order to revive the industry cotton merchants resorted to supplier development initiatives in the form of contract farming. Contract farming is increasingly becoming the principal method of financing agricultural activities (Buka, 2017). On the same note, contract farming in a way, has managed to commercialise agriculture in developing countries (Ruml & Qaim, 2020a, 2020b). Therefore, many cotton merchants that are faced with upstream supply chain disruptions as a result of cotton seed shortages resort to contract farming as a strategy for sourcing and supplier development initiatives. The perspective for contract farming is a strategic sourcing initiative that is sparingly assessed in the extant literature. Most studies focus is on the socioeconomic side of contract farming (Debela et al., 2021; Chazovachii et al., 2021; Mazwi et al., 2020; Chambati & Mazwi, 2022; Ruml & Qaim, 2020a, 2020b; Meemken & Bellamare, 2020; Ruml et al., 2020), while an insignificant number of studies take a procurement/supply chain perspective (e.g. Mukucha, Tsekea, et al., 2024; Mukucha, Jaravaza, et al., 2024; Mukucha et al., 2023; Mukucha & Chari, 2022, Mukucha & Chari, 2021).

The advent of contract farming came as a result of the fact that, the bulk of cotton growers in Zimbabwe are smallholder farmers who are generally poorly resourced and deficient in the sound agronomical practices (Mutambara & Mujeyi, 2021). Ideally, contract farming works well in a monopsony environment, such as the one prevalent in the sugar industry or the then cotton industry during the era of the now defunct Cotton Marketing Board (CMB). However, the cotton industry in Zimbabwe is characterised by an oligopsony. Of which an oligopsony status breeds fertile ground for some pertinent issues currently bedevilling the cotton industry in Zimbabwe. Such inkling notions include but not limited to side marketing (Mukucha, Jaravaza, et al., 2024) and contract defaults (Mazwi et al., 2020).

Cotton merchants in Zimbabwe plough in a cumulative investment to the tune of US$4,556,667,997 as a contract farming package to the farmers in order to increase their capacity utilisation. However, to date capacity utilisation is still very low. The statistics from the AMA, which is the regulatory authority, indicate that the national ginning capacity stands at 600,000 tonnes, while the current capacity utilisation is at 41% for lint, and 58% for cotton seed. It is however, evident basing on the relavant scholarly output so-far that, very few studies have taken the procurement and supply chain management perspective of supplier development initiatives in the form of contract farming in Zimbabwe. Therefore, this study seeks to examine contract farming as a dimension of supplier development initiatives meant to create sustainable supply of raw materials in order to maintain capacity utilisation of agro-processing industries at maximum levels. This is particularly important considering that almost all cotton farming in Zimbabwe is currently conducted under contract farming. Having outline the main thrust of the study, the rest of the study is organised as follows: literature review on the relationship between supplier development initiatives in the form of contract farming and yield, and the extent to which the cotton farmers meet the national yield target of 2000 per hactar, as well as an outline of the methods used to assess the specified hypotheses. Thereafter, the study presents the results and the related discussion of the research findings. The study folds by making empirically based conclusions and recommendations. Future research agenda is also specified based on the identified limitations of this study.

## 2. Literature review

### *2.1. Supplier development initiatives in the form of contract farming*

Supplied development is a cooperation between the merchants and their suppliers in order to improve suppliers' performances in terms of quantity supplied, procuring materials at lower prices and in good quality (Chavhan et al., 2018). Supplier development as a phenomenon has been widely researched in the extant literature (e.g. the likes of, Glock et al., 2017; Proch et al., 2017; Mizgier et al., 2017). In the agro-processing industry supplier development takes initiatives in the form of contract farming (Mukucha & Chari, 2021). Contract farming has recently gained prominence as the main source of funding for agricultural activities in developing countries (Meemken & Bellemare, 2019; Bellemare, 2018). Contract farming is a forward agreement between an agro-processing merchant and a contracted farmer (Meemken & Bellemare, 2020). Usually, the agro-processing merchants identify the shortcomings among the existing suppliers (farmers) and then set out modalities to improve those shortcomings (Mukucha & Chari, 2021).

Moreover, contract farming facilitates effective planning (Meemken & Bellmare, 2020), and reduces supply risks for key raw materials thereby ensuring uninterrupted production by agro-processing firms (Ruml & Qaim, 2020a, 2020b).

The current perspective in literature has two overarching typologies of contract farming. The first typology by Eaton and Shepered (2001) has generally five types of contract farming models which are namely the informal model, the intermediary model, the multipartite model, the centralised model and the nucleus model. Cash crops are usually grown under the multipartite model that involves a regulatory authority as the main player. The second typology according to Mighell and Jones (1963) categorises farming contracts into marketing contracts and resource-providing contracts. Marketing contracts provide a guaranteed market and price for the farmer's produce, but being common for low value crops, such as horticultural produce (Ruml & Qaim, 2020a, 2020b). On the other hand, resource-providing contracts offer credit inputs and agricultural extension services over and above what marketing contracts provide (Mukucha et al., 2023). The merchants involved in resource provision contracts deduct the costs of the extended services from the farmers' sales proceeds (Ruml & Qaim, 2020a, 2020b). Farmers under resource-providing crops tend to specialise in the production of the contracted crop (Mazwi & Chambati, 2023) thereby ending up improving their yield (Ragas et al., 2018; Maertens & Velde, 2017). Resource provision contracts are common with high value cash crops such as tobacco and cotton despite being plagued by retrogressive practices, such as side marketing (Mukucha, Tsekea, et al., 2024).

A general scan of the farming contracts indicates that the main clauses of the contract emphasise upon the general obligations and rights of each party, specification of the crop to be produced, production technology to be adopted, the determination of the purchase price and the jurisdiction to hear the disputes (Mazwi et al., 2020). Farmers enter into these contracts in order to have access to agricultural inputs, relevant extension services that enables them to adopt sound agronomical practices, and earn lucrative output prices (Mazwi et al., 2018). On the other hand, merchants also enter into farming contracts for the purposes of acquiring adequate amounts of the supplies with acceptable quality and at competitive total cost of ownership (Mukucha & Chari, 2021).

One of the prerequisites for farmers to engage in contract farming is that they must own or possess land suitable for agricultural purposes (Ruml & Qaim, 2020a, 2020b). Traditionally, merchants preferred to deal with large scale commercial farmers who would be having vast tracks of arable land (Ncube, 2020; Minot, 2018). However, the embankment on the Fast Track Land Redistribution (FTLR) programme led to the shifting of land possession from well-resourced and experienced commercial farmers to poorly resourced and inexperienced peasant farmers (Shonhe et al., 2021; Mukucha et al., 2023). This necessitated the need for capacitating the new land owners with other crucial means of production. The capacitating programme took the form of contract farming which is a special type of supplier development initiative (Mukucha & Chari, 2021).

### *2.2. Crop yield*

Cotton merchants are primarily concerned with an increase in the quantity and quality of procured seed cotton (Mutambara & Mujeyi, 2021). In line with increased quality and quantity of cotton, there is need for adequate volumes to increase capacity utilisation. which would lead eventually result in the concerns with contracted farmers' productivity in terms of yield (Mutambara & Mujeyi, 2021). Cotton merchants provide almost all the material inputs and extension services as the contract farming package that are required in order to improve yield. Yield is measured by output in kilograms per hectare (Mazwi et al., 2020). However, contract farming packages alone cannot determine the yield. There are several factors that determine the yield of crops planted and harvested in a piece of land such as resources for improving soil quality (Sawan, 2017), access to adequate land size (Mazwi et al., 2020) availability of quality of inputs (Mutambara & Mujeyi, 2021), location of farming activities in a conducive climate (Njanji & Parwada, 2023), adoption of good agronomic practices (Mutambara & Mujeyi, 2021), as well as upgrading contracted farmers' levels of education (Paltasingh & Goyari, 2018) and access to productive labour (Mutambara & Mujeyi, 2021; Ruml & Qaim, 2020a, 2020b).

### 2.3. Theoretical background and hypothesis development

One of the leading theories adopted in supplier development initiatives is the theory of constraints (TOC) which is a brain-child of Goldratt (1990) conception. The TOCs focuses more on explanatory power in seeking to understand the motivations behind the supplier development concept. The major focus of the TOC is to maximise throughput through minimising the limiting factors (Ikeziri et al., 2019; Bisogno et al., 2017). The TOC identifies the weakest link in the supply chain as is evidenced by bottlenecks (Pacheco et al., 2019). The theory is premised upon the assumptions that the measurement of control of firms is rooted in the variations of throughput, operational expenses and inventory measures (Goldratt, 1990). Throughput relates to the money generation rate through sales; operational expenses related to turning inventory into throughput; while inventory is the expense incurred in procuring trading stock (Rota & de Souza, 2021).

The TOC contends that goal achievement is limited by at least one constraint (Watson et al., 2007). A constraint is anything that limits a system from attaining its maximum performance. A constraint interferes with a firm's ability to achieve its goals (Goldratt, 2008). A constraint can either be internal or external. An external constraint is prevalent if a firm produces more than what is demanded in the market, while internal constraints exist if the market demands more from a supplier than what a supplier can deliver. There are several ways of classifying constraints such as capacity constraints, resource constraints, market constraints, political constraints and raw materials constraints (Buyukyilmaz & Gurkan, 2009; Chari & Ngcamu, 2019). It is the later constraint that leads to the need for supplier development initiatives in the form of contract farming for agro-processing firms due to the shortages of raw materials. In most agro-processing industries, the constraints revolve around politics of land utilisation, and resources availability (Shonhe et al., 2021). The strategic direction proposed by the TOC involves identifying and eliminating constraints that hinder firms from maximising their value addition processes (Watson et al., 2007). This involves systematically dealing with the identified constraint until it has ceased to be a limiting factor.

However, the cotton industry is plagued with a lot of internal constraints particularly the shortage of seed cotton from the farmers. It has been alluded to previously in this exposition that, there is increasingly a shortage of land for cotton farming due to most governments' coming up with policies that favour the production of food security-enhancing crops, such as maize (Mazwi et al., 2018). Moreover, in the case of Zimbabwe the Fast Track Land Reform Programme (FTLRP) has taken away productive land from well-resourced large commercial farmers into the hands of poorly resourced peasant farmers (Shonhe et al., 2021; Manyanhaire, 2015) leading to drastic plummeting of both quantity and quality availed to the market (Chingosho et al., 2021). The result created being a business case for supplier development initiatives in the form of contract farming (Mukucha & Chari, 2021).

Usually, if there is high demand in the market for the processed products merchants tend to produce more or order more from their suppliers. In the event that suppliers cannot meet a merchant's demand, then supplier development initiatives would act as a strategic solution to the buyers' handicap (Krause 1997). Therefore, merchants would need to conduct supplier assessments whose logical consequences lead to supplier development (Yegon et al., 2015) in the form of contract farming arrangements (Mukucha & Chari, 2021). In the cotton industry in Zimbabwe contract farming has become the sole means of procuring raw materials. For instance, the recently promulgated statutory instrument SI 96 of 2021 (Control of Sale of Cotton) Regulations prohibits open market sourcing of seed cotton, leaving contract farming as the only legal way of sourcing seed cotton.

Suppliers tend to provide resources to the merchants in order to enhance their productive capacity in a bid to eliminate the prevailing constraint. Thus, the TOC initiate the identification of the need for supplier development initiatives. Once the constraints with the farmers have been identified the merchants have to provide the resources in shortage. The provision of the resources is enshrined in the Resource Based View (RBV) theory. The RBV theory was conceptualised by Barney (1991). The theory contents that firms attain some competitive advantage if they have unique, valuable, inimitable and non-substitutable resources at their disposal (Barney, 1991). The resources include both animate and inanimate as well as tangible and intangible assets (Barney et al., 2021; Barney, 2021). Such resources can be sourced internally through learning experiences in the case of intangible assets or can be

accumulated through retained profits (Alvarez & Barney, 2017). However, where the chances of internally accumulating the competitive resources are limited, firms can scout for external partners. These partners are chosen for their ability to provide resources that can enhance the productivity of a firm. One such partnership is contract farming in the case of firms in the agro-processing industry.

The improvement in productivity as a result of supplier development initiatives is mostly achievable through the provision of appropriate resources (Mukucha, Tsekea, et al., 2024; Mukucha, Jaravaza, et al., 2024). The provision of resources capacitates suppliers who in the case of contact farming are the farmers (Mazwi et al., 2023). The case is particularly the evident with smallholder farmers who usually found themselves with pieces of land courtesy of the politically motivated land redistribution exercises. However, these farmers usually lack the necessary physical inputs, such as seeds, chemicals and pesticides to productively carry out commercial farming activities. Moreover, they also lack the requisite knowledge for sound agronomic practices that are associated with good yields. Therefore, the provision of resources enables the suppliers to the extent that they would improve not only the quantities delivered, but also the quality and delivery performance (Ruml & Qiam, 2020a, 2020b). Based on the logic explained above, it is expected that;

*H1: There is a statistically significant relationship between contract farming investments and crop yield.*

It is common for industries to set a target or a standard of productivity in the upstream industries that would enable them to provide uninterrupted supplies of raw materials. These targets can be set by either individual firms, an association of firms or through the coordination of the central government. This practice has been common for staple food crops, such as maize (Siziba et al., 2019: Mugiyo et al., 2021), and cash crops, such as tobacco (Newsham et al., 2021; Mazwi et al., 2019) and cotton (Baudron et al., 2022).

An international average yield for cotton stands at 1700 kg/hacter while Australia has a national average of 3000 kg/ha (Buka, 2016). In 2013, AMA placed a benchmark yield of 2000 kg/ha which was to be achieved for the next ensuing years. Considering that cotton farmers were provided with all the necessary inputs under the resource-providing contracts with the several cotton agro-processing merchants (Shonhe & Scoones, 2022) the onus to achieving the target lie in the technical efficiencies of the contracted farmers (Pangapanga-Phiri et al., 2024). Therefore, due to supplier development initiatives in the form of contract farming, it is expected that;

*H2: Crop yield from contracted farmers is statistically above the specified benchmark yield.*

## 3. Methodology

### 3.1. Data collection procedures

The study uses secondary data obtained from several publications by the AMA which are compiled by Buka (2016). AMA is a statutory board incorporated under the (CAP 18:24) which regulates the growing and marketing of several crops. More specifically, it superintends the registration of players in the cotton industry such as farmers, ginners and relevant associations. It administers S.I 142 (2009), S.I.63 (2011) and SI 96 of 2021 (Control of Sale of Cotton) Regulations which relate to grower registration, licensing contractors, buyers and ginners, monitors seed cotton grading and lint classification and marketing of cotton. A census of all the data related to contract farming investment and yield for a six-year period (2011–2016) was analysed. The data related to contract farming investments only, since cotton farming in Zimbabwe entirely relies on contract farming beginning from the year 2000. The analysed data are shown in Table 1.

### 3.2. Statistical analysis procedures

Statistical data analysis was conducted with Statistical Package for Social Scientists (SPSS) using simple linear regression for the first hypothesis. Simple linear regression analysis is an estimation of an impact of one variable on another variable using a straight line (Saunders et al., 2018). It can also be used for assessing the strength of a relationship between two variables (Maulud & Abdulazeez, 2020). The variables involved in regression analysis should be quantitative in nature (Montgomery et al., 2021). One samples *t*-test was used for assessing the second hypothesis. One sample *t*-test is a statistical tool

**Table 1.** Cotton investment and yield.

| Season | 2010/2011 | 2011/2012 | 2012/2013 | 2013/2014 | 2014/2015 | 2015/2016 |
|---|---|---|---|---|---|---|
| Cost of inputs (USD in millions (m) | $ 36 m | $ 42 m | $ 22 m | $ 32 m | $ 20 m | $ 21 m |
| Hectares | 380,000 | 450,000 | 240,000 | 250,000 | 200,000 | 180,000 |
| Production (metric tonnes) | 250,000 | 350,000 | 145,000 | 136,000 | 104,000 | 80,000 |
| Yield (kg/ha) | 658 | 770 | 604 | 540 | 500 | 400 |

Source: Buka (2016).

**Table 2.** Descriptive statistics.

| Variable | Attributes | | Statistic | Std. error |
|---|---|---|---|---|
| Cost of inputs | Mean | | 28,833,333.33 | 3,745,367.509 |
| | 95% Confidence Interval for mean | Lower bound | 19,205,559.65 | |
| | | Upper bound | 38,461,107.02 | |
| | 5% Trimmed mean | | 28,592,592.59 | |
| | Std. deviation | | 9,174,239.296 | |
| | Minimum | | 20,000,000 | |
| | Maximum | | 42,000,000 | |
| | Range | | 22,000,000 | |
| | Skewness | | 0.464 | 0.845 |
| | Kurtosis | | −1.821 | 1.741 |
| Yield | Mean | | 578.67 | 52.646 |
| | 95% Confidence Interval for mean | Lower bound | 443.33 | |
| | | Upper bound | 714.00 | |
| | 5% Trimmed mean | | 577.96 | |
| | Std. deviation | | 128.957 | |
| | Minimum | | 400 | |
| | Maximum | | 770 | |
| | Range | | 370 | |
| | Skewness | | 0.178 | 0.845 |
| | Kurtosis | | −0.075 | 1.741 |

that compares a mean score with an expected value (Francis & Jakicic, 2023). It determines whether a sample comes from a population with a specific mean (Al-Kassab, 2022).

## 4. Results

The results in this study relate to the descriptive statistics, determination of the effect of contract farming investments on yield per hactare, and then a comparison of yield performance against the expected target yield of cotton seed that was set by the regulatory authority.

The descriptive statistics shown in Table 2 offer information on each study variable's arithmetic mean, range and standard deviation. The average annual investment for cotton farming was around US$ 28.8 million dollars, with less a variability, SD = 9.17, and the average yield was approximately 579 tonnes per hectare, with a less standard deviation, SD = 128.96. The range for annual investment was US$2.2 ranging from US$2.0 to US$4.2, and for yield was 370, ranging between 400 and 770 tonnes/hectare.

A simple linear regression analysis is used in the investigation of the effects of contract farming investments on cotton yield in kilograms per hectare. Prior to testing the hypothesis, the assumption of data normality for the predictor and the criterion variables is assessed. The cost of inputs which is the predictor variable is approximately normally distributed as evidenced by the skewness statistic of 0.464 and the kurtosis statistic of −1.821. The assessment also reveals that the data for yield is approximately normally distributed as demonstrated by the skewness statistic of 0.178 (St. Error = 0.845), and a kurtosis value of −0.075 (St. error =1.741).

The proportion of the dependent variable variability that is accounted for by the independent variable is assessed and the results are shown in Table 3.

The model explains 68.2% of the variability. This implies that 63% of the variability of yield is attributed to supplier development investments in the form of contract farming inputs provision. The significance of the model is assessed using analysis of variance (ANOVA) and the results are shown in Table 4.

The results shown in Table 4 indicate that a significant regression equation is obtained, $F$ (1,4) = 8.596, $p$=0.43. Having obtained a significant regression equation, the analysis proceeded to assess levels of the relationship between contract farming investments and the related yield and the results are shown in Table 5.

**Table 3.** Model summary.

| *R* | *R* square | Adjusted *R* square | Std. error of the estimate |
|---|---|---|---|
| 0.826[a] | 0.682 | 0.603 | 81.24952 |

[a]Predictors: (Constant), cost.

**Table 4.** ANOVA analysis.

| Model | Sum of squares | df | Mean square | *F* | Sig |
|---|---|---|---|---|---|
| Regression | 56,743.393 | 1 | 56743.393 | 8.596 | 0.043[b] |
| Residual | 26,405.941 | 4 | 6601.485 | | |
| Total | 83,149.333 | 5 | | | |

[a]Dependent variable: yield.
[b]Predictors: (Constant), cost.

**Table 5.** Regression analysis.

| | Standardized coefficients | | | 95.0% Confidence interval for *B* | |
|---|---|---|---|---|---|
| Model | Beta | *T* | Sig | Lower bound | Upper bound |
| Constant | | 2.051 | 0.110 | −86.313 | 574.028 |
| Cost of inputs | 0.826 | 2.932 | 0.043 | 0.615 | 22.608 |

Dependent variable: yield.

**Table 6.** One-sample *t*-test.

| | Test value = 2000 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence interval of the difference | | | | |
| | *T* | Df | Sig. (2-tailed) | Mean difference | Lower | Upper | Mean | Std. dev | Std. EM |
| Yield | −26.998 | 5 | 0.000 | −1421.333 | −1556.67 | −1286.00 | 578.67 | 128.957 | 52.646 |

The predictor variable's impact on yield is found to be statistically significant, $B = 1.161$, 95% CI [0.615, 22.608], $p < 0.043$, indicating that for every one unit increase in dollar investments yield changes by 1.161 kg of harvested cotton seed. The regression equation can be presented as follows; yield = 243.86 + 11.61 (Cost of investment). Confidence intervals indicated that it is possible for a 95% certainty slope prediction yield from cotton farming investments which is between 0.615 and 22.608. Therefore, the null hypothesis is rejected and the alternative hypothesis is retained.

The study also hypothesised that due to contract farming initiatives the yield would exceed 2000 kg/hectare as stated by the regulatory authority's target. A one-sample *t*-test is used to test the hypothesis. The results are shown in Table 6.

Results of the one-sample *t*-test show that the mean cotton yield in kg per hectare ($M = 578.67$, SD = 128.957) is statistically significant at the 0.05 level of significance, $t$ (6) = −26.998, $p < 0.001$, CL, 95% [−1556.67, −1286.00]. The result suggests that the average yield per hectare over the years is statistically below the set target of 2000 kg/hectare.

## 5. Discussion

There has been inconsistent production levels in the cotton industry (Mutambara & Mujeyi, 2021) despite the fact that almost all the cotton production in Zimbabwe is done through contract farming (Mutambara & Mujeyi, 2021). The decline in productivity despite the provision of resources from merchants might be due to land size, depleted soil nutrients, inadequate application of inputs and climate change (Kumirai et al., 2018). These inconsistent production levels may be attributed to the nature of farmers involved in cotton growing. Most of the cotton farmers are poorly resourced people domiciled in arid and semi-arid communal areas which are deemed to be of no economic value during the colonial era (Mazwi et al., 2021). These farmers tend to practice monoculture due to lack of alternative land to practice shift cultivation. Shift cultivation is an agricultural practice of alternating cultivation of pieces of land in order to preserve soil fertility. Monoculture leads to a decline in soil fertility (Sunitharan et al., 2016). Usually,

over-used land gets depleted of vital soil nutrients leading to poor crop quality and low yields. This is further worsened by land fragmentation as a result of apportioning land among siblings which may lead to low economies of scale (Mukucha et al., 2023). According to Seed and Khan study, higher efficiency levels in tomato production are achievable on large commercial farms compared to smallholder farms.

The study empirically proves the fact that, contract farming initiatives lead to improvements in yield. These findings are in line with the findings from a study by Khanal et al. (2020) which insist that, contract farming participation under several conditions lead to improved yield for ginger crop. Furthermore, empirical support for improvement in yield as a result of contract farming initiatives came from a study by Ruml and Qaim (2020a, 2020b). The fact that there is a statistically significant relationship between contract farming investment and yield in the cotton sector, while at the same time yield is still below the specified target suggest that the levels of investments is still very low. The implications are that cotton merchants are supposed to increase investments in contract farming in order to increase the output to the levels that improves capacity utilisation. The improvement in capacity utilisation as a result of additional investments is in line with the RBV theory where the provision of resources is likely to improve the productivity of entities. More specifically, the provision of cotton farming input resources enables farmers to adopt good agronomic practices that improve yield. This suggestion may come to fruition if the recently promulgated Statutory Instrument 96 of 2021 (Control of Sale of Cotton) is tightly enforced. The statutory instrument criminalises open market sourcing of cotton from contracted farmers. Such a piece of legislation is likely to attract additional external investment from several downstream merchants.

Most of the smallholder cotton farmers use their own labour which in most cases is not adequate. Contract farming leads to the engagement of additional labour force for activities, such as land clearing, planting, weeding and harvesting (Meemken & Bellemare, 2019; Ruml & Qaim, 2019). The need to supplement labour with hired labour is not sustainable since labour costs are high in Zimbabwe and tend to squeeze the profit margins (Shonhe et al., 2021). Low labour rates have driven most of the excess labour that used to be in Zimbabwe to the neighbouring countries where pastures are green. It is therefore suggested that cotton farmers in Zimbabwe ought to progressively drift away from overreliance on human labour to mechanised agronomic practises. However, a delicate balance must be found since the use of human labour is attributed to the high quality of seed cotton from Zimbabwe (Njanji & Parwada, 2023). Thus, the use of mechanised agronomic practices may lower the quality of harvested cotton.

Moreover, most of the smallholder farmers involved in cotton farming lack the relevant knowledge appropriate for cotton farming (Mutambara & Mujeyi, 2021). The inadequacy in knowledge result in such famers failing to fully grasp some of the technical extension advices from both government agricultural extension officers, and cotton merchants' agronomists. The lack of proper education is suspected to be the reason why most farmers in the cotton industry are associated with poor agronomic practices that are attributed to low productivity in the cotton farming industry (Mutambara & Mujeyi, 2021), Mazwi et al. (2020) suggest that inefficiencies among contracted smallholder farmers is due to low levels of education. Smallholder farmers tend to disregard sound agronomic practices, such as conducting soil fertility tests (Mazwi et al., 2020).

Smallholder farmers have been known to divert input resources to other uses (Shonhe, 2018; Buka, 2017). The diversion is usually directed to other non-contracted crops which in most cases are food crops like maize (Mazwi et al., 2018). The other form of diversion takes the form of liquidating input resources using the black market in order to finance social expenditures like groceries, and paying school fees for the children. These diversions of inputs tend to affect yield severely. The viable option, among other options, for reducing this malpractice is to employ agricultural extension officers who do constant monitoring of the contracted farmers. This practice of monitoring contract farmers is already effective in other contracted crops such as sorghum production with Delta beverages scheme.

Inadequate and late deliveries of inputs (Shonhe et al., 2021) have been cited as one of the compelling reasons for low yields in the cotton industry in Zimbabwe (Mutambara & Mujeyi, 2021). If crops are planted late, they tend to complete their life cycle outside the natural farming season. This tends to affect yield as the crops may fail to have adequate rainfall or they may be affected by changes in weather conditions. Such a problem is common with state-sanctioned contract farming where bureaucratic

practices tend to derail efficiencies in supporting agricultural activities leading to poor yields (Mazwi et al., 2019).

Depressed yields are indicative of smallholder farmers' inefficiencies. The efficiency in cotton production by smallholder farmers is also affected by poor public infrastructure such as roads. Public roads are a necessity for farmers who constantly practice inbound logistics win the case of bringing in input resources from the merchants and outbound logistics during times of sending farm outputs to the market in general and the merchants in particular (Coulter et al., 1999). Therefore, the authorities from both the central and the local government must invest in public infrastructure, such as roads in order to increase efficiency in cotton production. The reason for such efforts is that cotton is a strategic crop of national importance which brings in a lot of foreign currency after gold and tobacco.

Cotton is mostly grown by smallholder farmers who are many in numbers (Mutambara & Mujeyi, 2021). Smallholder farmers are associated with subsistence farming that is characterised by low yields (Meemken & Bellemare, 2020). The implications being that the existing cotton merchants are most likely to deal with an exceedingly huge supplier base. The argument being that, smallholder farmers have got small pieces of land not exceeding 10 hectares. The challenge with a huge supplier base is that there is poor buyer-supplier relationship and spiralling transaction costs (Lysons & Farrington, 2020). There are four broad aspects of transaction costs that are faced with merchants as a result of having to deal with a larger supplier base: cost of drafting, negotiating and enforcing contracts; maladaptation costs related to contract defaults; governance costs; and bonding costs (Deitrich, 1994).

It is therefore recommended that cotton merchants must resort to supplier base rationalisation so as to deal with a lean supply base. Supplier base reduction is a strategic process of downsizing the number of existing suppliers (Andersen & Kreye, 2023; Molinaro et al., 2022). A lean supply base leads to reduced opportunist behaviour on the part of contract farmers, lowers purchase price as a result of economies of scale, and increased supplier responsiveness (dos Santos et al., 2020; Kumar et al., 2018). Since the existing smallholder suppliers have proved to be less productive for various reasons, it is hereby suggested that cotton merchants must shift to A2 and commercial farmers who have adequate land and appreciation of sound agronomic practices necessary for achieving better yields (Mukucha et al., 2023).

Last but not least, taking cognisance of the fact that, the nation is failing to reach the target yield and overall output to maintain capacity utilisation in the concerned agro-processing industries, contract farming initiatives need to be diverted from the current smallholder farmers to commercial farmers. Smallholder farmers seem to lack efficiency in their agronomic practices and they are no longer attaining economies of scale (Mukucha et al., 2023). These smallholder farmers seem to use outdated agronomic practices that lead to diminishing returns (Paltasingh & Goyari, 2018). Therefore, if cotton merchants are to improve their capacity utilisation, they need to seek new partners for the supply of strategic raw materials. The likely new partners must be sourced from the recently resettled A2 commercial farmers. A2 farmers have vast tracts of land which are largely under-utilised (Shonhe et al., 2021). However, a strategic shift in contract farming approaches is essential for the cotton industry to thrive, despite political sensitivities.

## 6. Conclusions

Most research streams on contract farming are tilted towards the issues surrounding the farmers' side through the socioeconomic and agricultural economics perspectives touching on issues, such as capacitating smallholder farmers through credit facilities, and securing marketing channels for the harvested crops. However, the procurement side which takes contract farming as a form of supplier development initiative is largely neglected in the extant research streams. The major thrust of contract buyers engaging farmers in contract farming is to ensure that there is an uninterrupted supply of key raw materials for their processing plants, and secure stable purchase prices. The revival of the cotton industry requires some policy intervention by the central government, such as provision of more land for cotton production which would allow farmers to practise crop rotation. The government ought also to criminalise the diversion of input resources by contract farmers through enacting further appropriate legislation over and above what already exists. Merchants must also provide input resources to the farmers promptly in order to farm within the cropping season.

Despite the limitations associated with this study, particularly the use of secondary data, the study remains valuable in terms of its theoretical and practical contributions to the discipline of strategic sourcing in general and contract farming in particular. Theoretically, the study supports the efficacy of the TOC in identifying the limiting factors in the agro-processing industry that culminate in necessitating the need for contract farming. Moreover, the study also proves the validity of the RBV theory in predicting the outcomes of contract farming schemes. More specifically, using the RBV theory the study predicts and empirically proves that investments in contract farming lead to improved yield.

This study therefore, makes a unique contribution in focusing on assessing contract farming arrangements from the procurement perspective through showing that contract farming is a special form of strategic sourcing through supplier development initiatives. Most of the previous studies in contract farming concentrate on the social aspects related to farmers. Therefore this study, adds more empirical weight to the growing appreciation of the previous studies that focus on contract farming from the strategic sourcing dimension.

## 7. Limitations and future research agenda

Empirically the study records a statistically significant relationship between contract farming investments and yield. Thus, it is not a speculation to suggest that the current low levels of yield are due to low investment in the sector. However, there are other factors that might have contributed to the current statistical yield that have been identified in the extant literature that need to be explored in future researches. Such factors include but not limited to soil fertility, the quality of inputs, sound agronomic practices and availability of good public infrastructure.

Ethodologically, the study records some limitations in terms of the nature of data used for operationalising the study hypothesis. The study made use of secondary data. Secondary data which poses inherent weaknesses in that it is accuracy may be difficult to evaluate,. Therefore, future studies intending to assess the relationship between supplier development investments and crop yield in the agro-processing industry ought to strive to use primary data. Primary data tends to be seamlessly aligned with a given study's hypotheses.

Ideally, a causal relationship is only established after some confounding variables have been controlled for (VanderWeele, 2019). In this study, the confounding variables for the relationship between supplier development investments in the form of contract farming initiatives and crop yield were soil quality, adequacy and quality of inputs, conduciveness of the climate, agronomic practices followed, levels of contracted farmers' education and availability of labour. These variables were not controlled in this study. Therefore, future studies must control these variables in order to reach robust conclusions about the relationship between supplier development investments and crop yield.

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No potential conflict of interest was reported by the author(s).

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