IMPACT OF VAT EXEMPTION REMOVAL ON AGRO-PROCESSING INDUSTRIES IN RWANDA

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Summary

The paper aims to analyze the impact of removing VAT exemptions on agro-processing industries. We use a stochastic profit frontier function to measure profit efficiency among Rwandan agro-processing industries between 2008 and 2016. Results show that increasing selling price and quantity sold has a positive and significant effect on profits in agro-processing industries (increasing selling price and quantity sold by 10% will increase the profit for agro-processing industries by 15.2% and 9.2% respectively) whereas increasing cost of goods sold by 10% reduces the profit of agro-processing industries by 14.5%. The quantity produced is positively related to the profit of agro-processing industries but not statistically significant. Profit efficiencies vary moderately among industries, ranging from 16.67% to 83.33% with a mean of 70%. This implies that on average, about 30% of the profit is lost to economic inefficiency, a gap which can be recovered by these companies.

Key words: Agro-processing industries; stochastic frontier analysis; Profit efficiency.

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Acronyms

CIF	Cost Insurance and Freight
CIT	Corporate Income Tax
GDP	Gross Domestic Product
MLE	Maximum likelihood estimates
PAYE	Pay as You Earn
RRA	Rwanda Revenue Authority
SFA	Stochastic Frontier Analysis
VAT	Value Added Tax

1 Introduction

Agriculture in Rwanda accounts for a third of Rwanda's GDP; it constitutes the main economic activity for rural households and remains their main source of income. Today, the agricultural population is estimated to be just under 80% of the total population. The sector meets 90% of the nation's food needs and generates more than 70% of the country's export revenues.

With its various intertwined services, the Ministry of Trade and Industry facilitates the strengthening of agro-industrial capabilities and linkages that improve opportunities for added value and serve as effective means of achieving economic transformation and sustainable livelihoods. The scope of this assistance goes beyond urban agro-industries to reach poor and marginalized rural populations as well as communities in post-war situations with services such as skill development, emergency supplies of agro-equipment, and the rehabilitation of food industries.

Over the years, the agricultural transformation through creation of forward and backward linkages with industry has been emerging as an important option to overcome the increasing challenges of creating employment opportunities for a growing labor force and sustaining the livelihood of households in rural areas. Furthermore, the agro-industry generates new demand on the farming sector for more and different agricultural outputs, which are more suitable for processing (Srivastava, 1989). In this context there is a need for improving the capacity of the agro-industries to harness backward linkages with agriculture and allied activities since it would efficiently convert part of the output to value added products acceptable to the domestic and international markets. This would generate employment opportunities for different types of skills through food processing, packaging, grading and distribution.

An important feature of agro-processing industries is that they are a major source of employment and income, thus providing access to food and other necessities to large groups of population. They are, therefore, essential elements in the attainment of food security goals. Food processing activities represent a potential source of livelihood for many poor people in Rwanda.
Depending on the Government policy orientation, the Government can offer incentives for supporting certain sector. Generally, incentives are offered either as direct incentives, indirect incentives and non-fiscal incentives. The common justification for incentives is that there are market failures which warrant government intervention. Market failures most often cited include externalities, infant industries, information asymmetry and uncertainty.

As stated in the compilation of fiscal laws and regulations in use in Rwanda, its sub-section 2 regarding exemptions and zero-rating; Article 15: "*The Minister may, by order, provide for a list of items to be exempted as provided for under articles 86 and 87 of this law. Basing on this right, agro-processing industries were exempted from Value Added Tax since 11 June 2008 until 11 September 2013.*" This removal of VAT exemptions on agro-processing industries was claimed by companies owning these industries saying that they were negatively impacted by Value Added Tax (VAT).

This study attempts to analyze the impact of the removal of VAT exemptions on agro-processing industries and to derive a statistical measure of profit efficiency of agro-processing industries using a stochastic profit frontier approach (helped to measure the ability of agro processing industry to achieve highest possible profit given the prices and levels of fixed factors of that industry). A subsequent research question is to found out if agro-processing industries' production decisions (output produced, employed employees) are consistent with profit maximization.

2 Literature

Agro-processing industries refer to those activities that transform agricultural commodities into different forms that add value to the product. "Agro-based industries are those industries which have either direct or indirect links with agriculture (Bhattacharya 1980). Agro-processing industries, especially food manufacturing, tobacco and textile processing dominate the commercial industrial sector. In this sense the agro- processing could be defined as set of techno-economic activities carried out for conservation and handling of agricultural produce and to make it usable as food, feed, fiber, fuel or industrial raw material. Hence, the scope of the agro-processing industry encompasses all operations from the stage of harvest till the material reaches the end users in the desired form, packaging, quantity, quality and price (Kachru 2008).

Following the work of Farrell (1957), efficiency can be defined as the ability to produce a given level of output at lowest cost. This concept has three components: technical, allocative and economic. Technical efficiency is defined as the ability to achieve a higher level of output, given similar levels of inputs or raw materials. Allocative efficiency deals with the extent to which agro-processors make efficient decisions by using inputs or raw materials up to the level at which their marginal contribution to production value is equal to the factor cost. Technical and allocative efficiencies are components of economic efficiency. It is possible for an industry to exhibit either technical or allocative efficiency without having economic efficiency. Technical and allocative efficiencies are therefore together necessary conditions for economic efficiency.

In the profit function approach, profit efficiency can be defined as the ability of a firm to achieve potential maximum profit, given the level of fixed factors and prices faced by the industry. Adesina and Djato (1996) recently applied this methodology in a study of efficiency of rice farmers in Cote d'Ivoire. On the other hand, an industry is said to be technically inefficient when it fails to achieve the maximum output from the given raw materials, or fails to operate on the production frontier.

Mbowa (1996) in his study on the sugarcane industry in South Africa defined an efficient farm as that which utilizes fewer resources than other farms to generate a given quantity of output. Yilma (1996) while studying efficiency among the smallholder coffee producers in Uganda defined an efficient farm as that which produces more output from the same measurable inputs than that one which produces less. Fan (1999) referred to technical inefficiency as a state in which actual or observed output from a given input mix is less than the maximum possible.

Rahman (2002, 2003) estimated a stochastic profit function for Bangladesh rice farmers. The results showed that there existed a high level of inefficiency in rice farming because γ was close to one. The average profit efficiency scores were 60%, which implied that the farmers could improve their profitability by as much as 40%. The farmers also exhibited a lot of profit inefficiency. The farm-specific factors responsible were poor access to input markets, unfavorable tenancy arrangements, and off farm employment.
Abdulai and Huffman (1998) examined the profit inefficiency of rice farmers in northern Ghana.

The empirical results show that farmers' human capital represented by the level of schooling contributes positively to production efficiency, suggesting that investment in farmers' education improves their allocative performance. Ogundari (2006) investigated factors that determine the profit efficiency among small scale rice farmers in Nigeria. The results showed that their profit efficiency where positively influence by age, educational level, farming experience and household size.

Recent studies proved that production functions have traditionally been used to examine efficiency of agro-processing in many developing countries (Parikh and Shah, 1995; Battese et Al., 1996; Battese and Coelli, 1995; Sharma and Singh, 1993) but Yotopoulos and others argued that a production function approach to measure efficiency may not be appropriate when agro-processors or industries face different prices and have different factor endowments (Ali and Flinn, 1989). This led to the application of stochastic profit function models to estimate agro-processing specific efficiency directly (Ali and Flinn, 1989; Kumbhakhar and Battacharya, 1992; Ali et al., 1994; Wang et al., 1996). Therefore, the objective of the paper is to determine the profit efficiency among agro-processing industries in Rwanda.

3 Methodology

3.1 Research design

The research used mixed methods approach by taking advantage of the differences between quantitative and qualitative methods. The target population was individuals or companies owning agro-processing industries in Rwanda with big investments[2] who reacted to the decision of removing the VAT exemptions on their products and are BAKHRESSA, ICM, MINIMEX, PEMBE and SOSOMA.

The research used **purposive sampling** which is known as most important kind of non-probability sampling where researchers rely on their experiments, cleverness and previous research finding to deliberately obtain units of analysis in a manner that the sample obtained may be regarded as being a representative of the relevant population. **Interview techniques** and **questionnaires** were used for obtaining detailed information and views of respondents towards the research. **Documentation technique** was used for getting information about the company's financial health. The research used also to **observe and evaluate** how people are engaging in this business and how business is running.

3.2 Major Variables for Data Collection and Analysis

In addition to assessing the impact of VAT, this study will also derive a statistical measure of profit efficiency of agro-processing industries using a stochastic profit frontier approach. In this regard, the

[2] Big investments or big agro-processing industries are those created on a big budget or for a big group of people, produce their goods using advanced technology and machines, many power and hired labor and produce goods meant for many people.

study uses a frontier analysis which is a means to measure the relative performance of the agro-processing industries by objectively providing a numerical efficiency value and ranking them accordingly. It shows how close agro-processing industries are to the "best-practiced" frontier in improving the performance of an industry by distinguishing the "best-practices" and worst-practices associated with the respective efficiency level. In addition, this study will investigate factors that determine the profit efficiency of agro-processing industries.

Data (from 2008-2016) regarding taxes paid by the selected companies were obtained from RRA database whereas data on evolution of quantity produced, quantity sold, production unit cost, selling unit price, quantity imported, expenses and number of employees were obtained from the concerned taxpayers. The data collected (on quantity of goods produced and output price) were used to compute industry total revenue as $P * Q$, where P is the price of the output and Q is the quantity produced while the industry level profit (π) was computed as difference between the total revenue and total variable cost expended on producing the goods i.e.

$$[Gross\ Margin\ in\ (\pi) = TQ - WX] \qquad (1)$$

3.3 Theoretical Framework

The stochastic frontier model was simultaneously proposed by Aigner et al (1977) and Meeusen and Vanden Broeck (1977)[3]. The research used Stochastic Frontier Analysis (SFA) because it helped in estimating the efficiency frontier and calculate the agro-processing industries' technical, cost and profit efficiency. SFA inquires that a functional firm be specified for the frontier production function and takes into account measurement errors and other noise in the data. The SFA, helped to specify the relationship between output and input levels and decomposes the error term into two components: a random error and an inefficiency component.

Furthermore, this approach distinguishes a functional form for the cost, profit, or production relationship among inputs, outputs and non-factors. Profit efficiency is broader concept since it takes into account the effects of the choice of vector of production on both costs and revenues. Two profit functions were distinguished, depending on either or not market force is taken into account; the standard profit function and the alternative profit functions.

The standard profit function assumes that markets for outputs and inputs are perfectly competitive. Given the input (W) and output price vectors (P), the firm maximizes profits by adjusting the amount of inputs and output. Thus, the profit function can be expressed implicitly as: $\pi = f(P, W, V, U)$ and in logarithm terms:

$$Ln(\pi + \theta) = Lnf(P, W) + (V - U) \ Eq \qquad (2)$$

Where θ is a constant added to the profit of each firm in order to attain positive values enabling them to be treated logarithmically. The exogenous nature of prices in this concept of profit efficiency assumes that there is no market power on the agro-processing industries' side. If instead

[3] Drew their works upon the Farrell (1957) seminar paper on efficiency measurement in which he defined productive efficiency as the ability of a firm to produce a given level of output at lowest cost.

of taking price as given, the agro-processing industries assume the possibility of imperfect competition, given only the output vector and not that of price. Thus, alternative profit function is defined as: $\pi a = \pi a(Y, W, V, U)$ in which the quantity of output (Y) produce replaces the price of output (P) in the standard function, $V - U$ is a composite error term.

3.4 The stochastic profit frontier model specification

The functional form of the stochastic profit frontier was determined by testing the adequacy of the Cobb–Douglas (highly restrictive) by fitting in the less restrictive translog. According to Sunday et al. (2012), the profit function model for the profit efficiency analysis was given by:

$$\boldsymbol{\pi = \frac{\pi}{\rho} = f(q_i; Z)\exp(V_i - U_i)\ 1, 2, \dots \dots \dots . n} \qquad (3)$$

Where: $\pi = normalized\ profit\ of\ ith\ firm$; $q_i = Vector\ of\ variable\ factors$;
$Z = Vector\ of\ fixed\ factors$; $\rho = output\ price$; $\exp(V_i - U_i) = Composite\ error\ term$
The stochastic error term consists of two independent elements $V\ and\ U$. The element V account for random variations in profit attributed to factors outside the firm's control. A one sided component $U \leq O$ reflects economic efficiency relatives to the frontier. Thus, when $U = O$, it implies that industry profit lies on the efficiency frontier (i.e. 100% profit efficiency) and when $U < 0$, it implies that the industry profit lies below the efficiency frontier. Both $V\ and\ U$ are assumed to be independently and normally distributed with zero means and constant variances, $N(0, \sigma^2 v)$. The U_is are profit inefficiency effects[4], which are assumed to be non-negative truncation of the half-normal distribution $N(\mu, \sigma^2 u)$. Agro-processing industries' profit is measured in term of Gross Margin (GM) which equals the difference between the Total Revenue (TR) and Total Variable Cost (TVC). That is:

$$GM(\pi) = \sum(TR - TVC) = \sum(PQ - WX_i) \qquad (4)$$

The explicit functional form for the agro-processing industries is:

$$\boldsymbol{Ln\pi = \beta_0 + \beta_1 LnZ_{1i} + \beta_2 LnZ_{2i} + \beta_3 LnP_{1i} + \beta_4 LnP_{2i} + \beta_5 LnP_{3i} + \beta_6 LnP_{4i} + \beta_7 LnP_{5i} + (V_i - U_i)} \qquad (5)$$

Where: π_i represents normalized profit computed as total revenue less variable cost divided by agro-processing specific product price, Z_1 represents average quantity produced in MT, Z_2 represents average quantity sold in MT, P_1 represents average price per kg of output, P_2 represents average price per kg of market price, P_3 represents average amount of sales, P_4 represents average amount of expenses, P_5 represents average amount of cost of goods sold. The inefficiency model U_i is defined by:

[4] Profit inefficiency in this context is defined as the loss of profit for not operating on the frontier (Ali and Flinn, 1989).

$$\boldsymbol{U_i = \partial_0 + \partial_1 M_{1i} + \partial_2 M_{2i}} \quad (6)$$

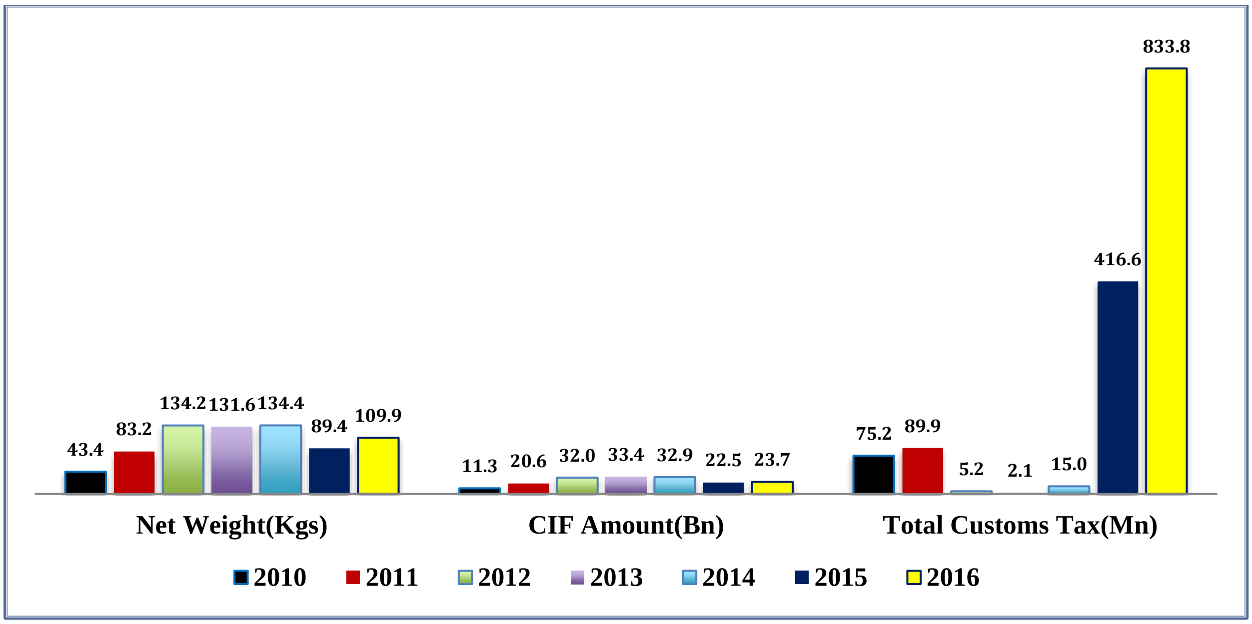
where M_1 represents number of employees by sex, M_2 represents working experience of employees in agro-processing industries. These socio-economic variables are included in the model to indicate their possible influence on the profit efficiencies of agro-processing industries (determinant of profit efficiency).

4 Descriptive analysis

4.1 Overall analysis of customs transactions for agro-processing industries

Figure 1 shows the evolution of net weight of goods imported by agro-processing industries for production purposes, excluding goods imported as equipment. As the figure indicates, the net weight of goods imported fluctuates with both increases and decreases over the years studied. For example, a large decrease in net weight occurred in 2015 (-33%). For CIF, the growth is positive and increasing at a decreasing rate between 2010 and 2013. The years 2014 and 2015 were marked by decreases of -2% and -32% respectively; this was due to reductions in the quantity imported.

Figure 1 Evolution of Net weight, CIF and Total Customs Taxes



The trend in total customs taxes illustrates sharp changes. In 2012 and 2013, there were sharp decreases of -94% and -60% respectively. Total customs taxes grew strongly in 2015 and doubled in 2016. This sharp increase in taxes was probably due to the removal of VAT exemptions.

4.2 Quantity produced and quantity sold by agro-processing industries

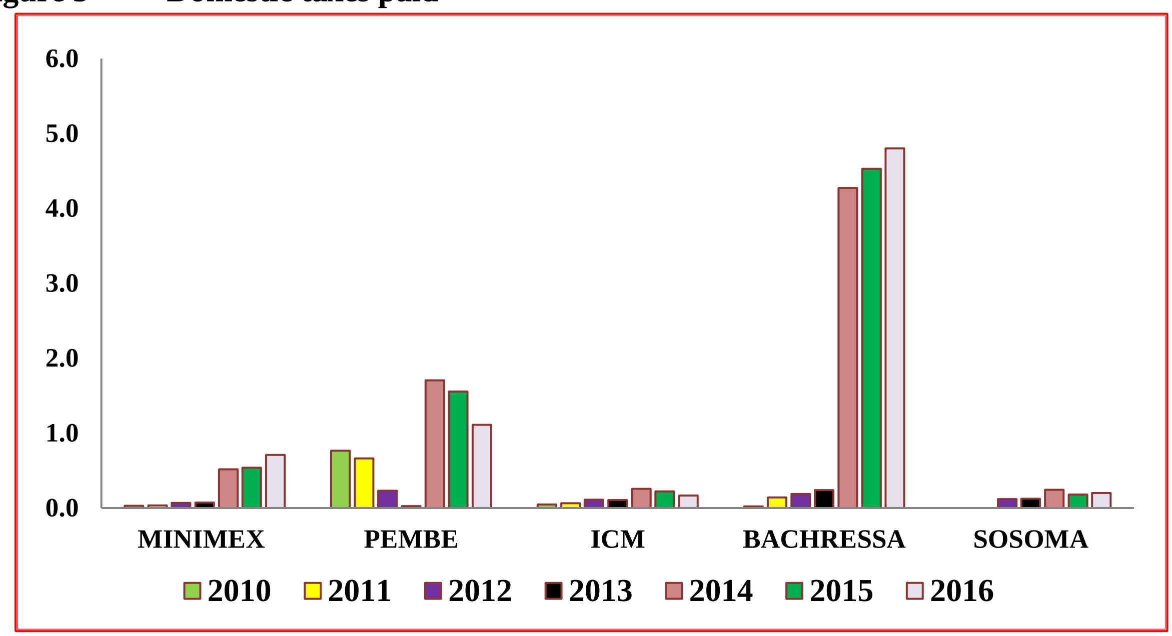
Regarding quantity produced and quantity sold by agro-processing industries, Figure 2 shows that both quantities produced and sold have upward trends between 2008 and 2013. That trend changes in 2014 after the removal of VAT exemptions. The quantity produced and sold return to gradual increases in 2015 and 2016.

Figure 2 Evolution of quantity produced and quantity sold

4.3 Taxes paid by agro-processing industries

This section shows the evolution of various domestic taxes paid by agro-processing industries over time.

Figure 3 Domestic taxes paid

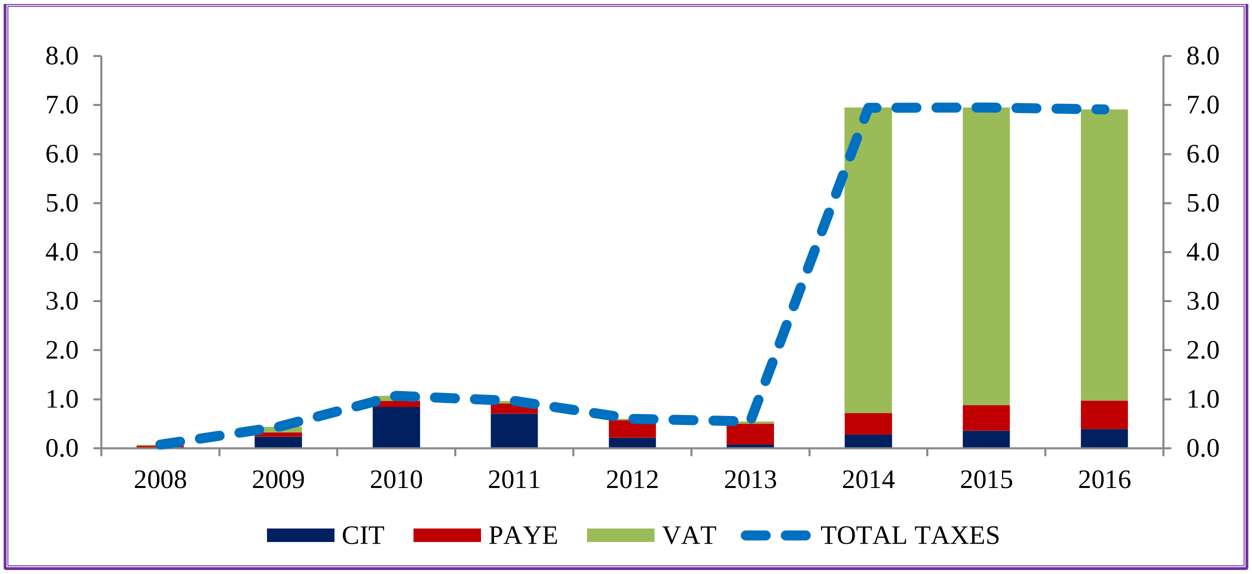


As **Figure 3** indicates, total domestic taxes paid by MINIMEX gradually increase in all years. For PEMBE, domestic taxes decreased from 2010 to 2013, grew strongly in 2014, and then decreased in 2015 and 2016. For ICM, there is a gradual increase in domestic taxes paid until 2014, after which it decreased in the following years. The total domestic taxes paid by BAKHRESSA grew gradually until 2013 before a sharp increase in 2014 and a return to gradual growth in 2015 and 2016. For SOSOMA, total domestic taxes were fluctuating with both increases and decreases over time. The strong growth of total domestic taxes paid in 2014 for all companies was due to the introduction of VAT where there was previously an exemption.

4.4 The trend analysis of domestic taxes received from agro-processors

As indicated by **Figure 4,** taxes paid are characterized by an upward trend between 2008 and 2010 and a downward slope from 2010 to 2013 and grew considerably in 2014, decreasing gradually in 2015 and 2016. Until 2011, Corporate Income Tax (CIT) was the dominant domestic tax contributor. The value of CIT received decreased in 2012 and 2013 before increasing gradually from 2014, with a lower contribution to total taxes than it had in 2009-2011[5].

Figure 4 Composition of total taxes paid



For PAYE, we observe continuous growth in the amount received, reaching a higher level than CIT from 2012. VAT was negligible and fluctuating in value before 2014, but it grew sharply in 2014 due to the removal of its exemptions and it has started decreasing gradually until 2016.

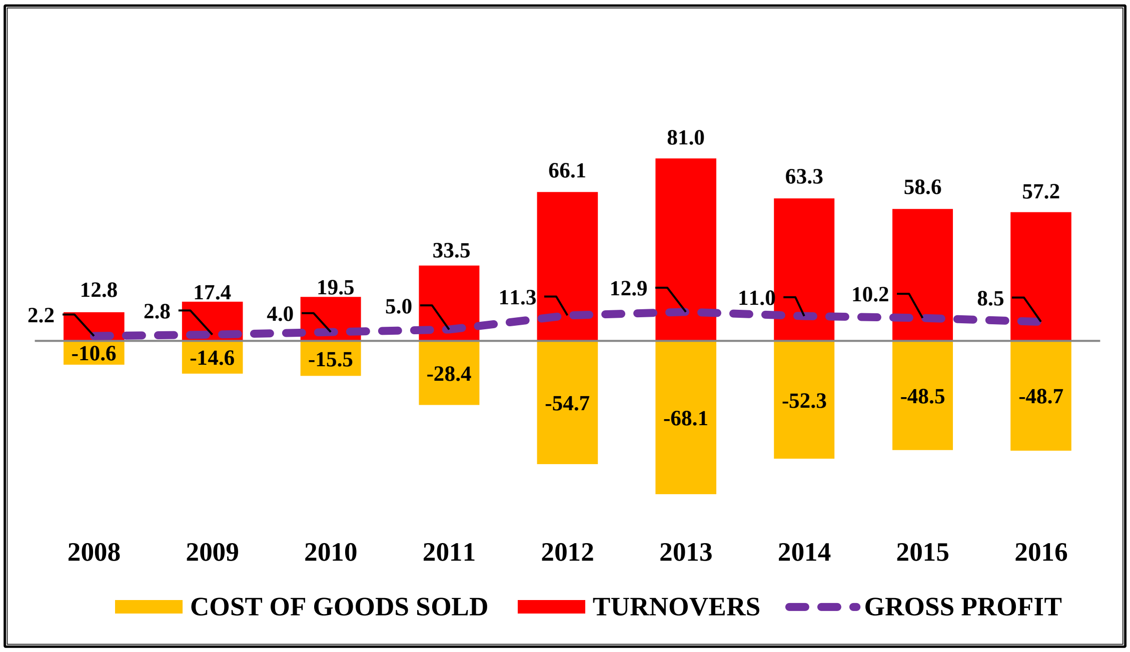
4.5 Analysis of gross profit for agro-processing industries

The gross margin or gross profit is calculated by subtracting total cost of goods sold from total sales. As **Figure 5** indicates, the gross margin was marked by an upward trend until 2013 and started to decrease gradually between 2014 and 2016. For all companies, there was sharp growth of 92.4%, 97.3% and 124.9% for cost of goods sold, turnovers and gross profit respectively in 2012 compared to 2011. This sharp increase was probably due to speculation about the removal

[5] During field work, Agro-processors said that paying VAT impacted negatively their Corporate Income Tax and caused CIT to tend reducing and VAT to grow.

of VAT exemptions that took place in September 2013. The general economy maintained its good performance in 2012.

Figure 5 Gross profit decomposition



The cost of goods sold is displayed as a negative value in **Figure 5** since it reduces profit but they should be interpreted using their absolute values. Cost of goods sold and turnover follow the same upward trend until 2013, after which they started declining gradually until 2016. During our survey, all agro-processors said the decline in 2014 was caused by introduction of VAT on their products as this led to high prices, decelerating sales and an increase in the closing stocks.

5 Stochastic profit frontier results

Table 1 summarizes the variables used in studying the efficiency of profit for agro-processing industries.

Table 1 Summary of descriptive statistics for variables

PARAMETERS	Mean	Median	Maximum	Minimum	Std. Dev.
Cost	305	350	499	75	149
Female employees	26	29	48	12	10
Male employees	131	137	187	86	29
Maturity	7	7	8	5	1
Selling price	464	462	655	207	119
Qproduced	2,727,670	2,062,475	6,759,000	207,000	1,940,376
Qsold	2,688,002	1,949,056	6,712,000	288,000	1,961,145

As indicated by results in **Table 2**, the coefficients of the variables except for d1-d3 are estimates from profit function maximum likelihood and are interpreted as elasticities of the variables.

Table 2 Maximum likelihood estimates of the stochastic frontier profit function

Log likelihood = -60.135679 | Wald chi2(8) = 379.83 | Prob > chi2 = 0.0000

lprofit	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
lprice	1.522528	.451749	3.37	0.001	.6371158	2.407939
lsold	.9248786	.1824962	5.07	0.000	.5671925	1.282565
lcost	-1.459349	.3562991	-4.10	0.000	-2.157683	-.7610157
lproduced	-1.256669	2.069216	-0.61	0.544	-5.312258	2.79892
sqlproduced	.0463658	.0758259	0.61	0.541	-.1022503	.1949819
d1	1.305206	.1322306	9.87	0.000	1.046038	1.564373
d2	1.00141	.1040244	9.63	0.000	.7975259	1.205294
d3	1.112886	.1023208	10.88	0.000	.9123413	1.313431
_cons	12.84914	15.29063	0.84	0.401	-17.11994	42.81822
/mu	-3.62758	25.60155	-0.14	0.887	-53.80569	46.55053
/lnsigma2	1.946389	4.477462	0.43	0.664	-6.829275	10.72205
/ilgtgamma	4.080536	4.557171	0.90	0.371	-4.851356	13.01243
sigma2	7.003353	31.35725			.0010816	45344.91
gamma	.9833824	.0744708			.0077571	.9999978
sigma_u2	6.886974	31.35753			-54.57265	68.3466
sigma_v2	.1163789	.0139407			.0890557	.1437022

The estimated model is:

$$Lnprofit = 12.84 + 1.52Lnprice + 0.92Lnsold - 1.45Lncost + 0.04Lnproduced$$

(0.84) (3.37) (5.07) (-4.10) (0.61)

The results from **Table 2** show that elasticities estimate for market price, quantity sold and production cost are statistically significant at 1% and 5%. The coefficients with positive sign increases profit while coefficients with negative sign reduce profit. The selling or market price, quantity sold and production cost were the most important variables determining profit efficiency; this means that for a 10% increase in selling price and quantity sold, the profit for agro-processing industries will increase by 15.2% and 9.2% respectively. And for 10% increase in cost incurred during production, the profit of agro-processing industries will decrease by 14.5%.

The quantity produced was entered as a quadratic term and is positively related to profit but not significant at all conventional levels of significance. This insinuates that lower production reduces profit and higher production increases profit. To predict the efficiency levels of these industries by mean and by categories of: id, the results show that BAKHRESA is the most efficient (0.92), followed by MINIMEX (0.66), and followed by PEMBE (0.22) and ICM (0.06).

Table 3 Inefficiency function

Source	SS	df	MS	
				Number of obs = 144
				F(6, 138) = 98.92
Model	38.571284	6	6.42854733	Prob > F = 0.0000
Residual	8.96858625	138	.064989755	R-squared = 0.8113
				Adj R-squared = 0.8031
Total	47.5398702	144	.330137988	Root MSE = .25493

Efficiency	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
d1	1.222204	.5042773	2.42	0.017	.2250946	2.219313
d2	1.385126	.5098285	2.72	0.007	.3770407	2.393212
d3	1.425989	.5059981	2.82	0.006	.4254771	2.426501
d4	1.547181	.5302933	2.92	0.004	.4986299	2.595732
lfemale	-.6156833	.0695846	-8.85	0.000	-.7532732	-.4780934
lmale	.2128387	.1294462	1.64	0.102	-.0431157	.468793

As can be seen from the results in **Table 3**, by assuming that number of males/females and experience at work measured in years affect efficiency of the companies, the results proved that too much experience may result into inefficiencies. This occurs when no new innovations are made due for example to the fact that managers have stayed in same position for so long and are unwilling to adopt new production techniques. The results showed also that for agro-processing industries, having a high ratio of female employees can reduce the efficiency or in other words, it can increase inefficiency of companies; given its negative coefficient and statistically significant.

Table 4 Frequency distribution of agro-processing industries profit efficiency estimates

Efficiency estimate (%)	Frequency	Percent	Cumulative percent
00>49.99	24	16.67	16.67
50>69.99	48	33.33	50.00
70>89.99	48	33.33	83.33
90>99.99	24	16.67	100
Total	144	100	

Table 4 shows that agro-processing profit efficiencies moderately range from a minimum of 16.67 to a maximum of 83.33% with average efficiency estimates of 70%. This insinuates that on the average, about 30% of the profit is lost to economic inefficiency. This value of 30% represents the gap that can be made by the agro-processing industries if they improve their technologies; this

will enable them to acquire raw materials, labor, and technology in terms of machinery at lower cost.

6 Challenges, recommendations and conclusion

6.1 Challenges encountered

Some key challenges that are hindering the optimal growth of this sector of activity after removing VAT exemptions established during survey are categorized into:

6.1.1 Challenges for Agro-processors

- Raw materials and production process for big agro-processing industries are differing to those of small agro-processing industries. The fact of maintaining the quality of goods produced and keeping the standards required for a top level industry player increase the cost of final products. The reinstatement of VAT on these products causes the selling price to appear high compared to products produced by small agro-processing[6] industries and this will decrease the market size for big agro-processing[7] industries because most of people including big consumers of maize flour like schools prefer to buy cheaper goods regardless of the quality and standards. The survey found also that volume of crop used by agro-processing industries is insufficient.
- Poor quality of raw materials available-particularly lack of hygiene, pesticide residues, inadequate selection and grading, improper packing and poor storage, wide variation in the quality of raw materials produced by smallholders together with high costs of raw materials (due to low yields).
- Improper controls for quality result in the production of poor quality or contaminated foods for markets, and this can lead to health problems or outbreaks of diseases. National reputations suffer where exported products are downgraded or rejected at point of importation. This can have considerable repercussions for other exporters from the same country (some of whom may be following strict quality control guidelines).
- In the same view for the above observation, for the case of MINIMEX for instance, 90% of its products are exported. This implies that most of quantity produced under MINIMEX is not locally consumed making MINIMEX produce below capacity. Out of the increased exports by MINIMEX, Rwanda may benefit in terms of foreign currency but loses a lot of domestic taxes (VAT, CIT) as locals turn to cheaper, poor quality consumption.
- Some of agro-processing industries said that their raw materials are exempted from VAT and covers more than 60% of their total cost. The addition of VAT on the selling price of final output tends to raise the price and it will not be easier for many Rwandans to afford such product given limited purchasing power. This creates substitution effect that causes sales to decline due to high selling price of products. They said also that VAT should be calculated on value created during processing process rather than on total value after processing (value including exempted raw materials).

[6] Small agro-processing industries are those created on a small budget or for a small group of people, produce their goods using small machines, less power and hired labor and located within a single place and produces goods meant for few people.

[7] Big agro-processing industries are those created on a big budget or for a big group of people, produce their goods using advanced technology and machines, many power and hired labor and produce goods meant for many people.

- Inadequate and/or expensive refrigeration facilities required for storage and inadequate transport and distribution systems.

6.1.2 Challenges for RRA and Agro-processing industries

- During field work found that big agro-processors are facing challenges of competition because most of their competitors' trade in informal manner and most of them try to evade taxes using different strategies. The way they operate is that most of competitors claim to fall below the eligible turnover for paying VAT; since RRA registration decisions are influenced by the size of the shop so some of the competitors hire separate stores elsewhere or operate backdoor stores to only have a small display shop for convincing that they are not eligible to pay VAT. Because the saying is that if the shop is very small, it cannot sell a lot of products. They use this strategy for convincing while categorizing those eligible for paying VAT as the size of the shop matters because if it's a very small shop, you cannot expect it to sell more to be eligible for VAT.
- Others have EBM machines but choose on how many invoices to sell through the system as RRA cannot tell whatever goes out of the shop. Eg: If total sales of the day are 1000Kgs; you put 300Kgs in the system and the other 700Kgs off book in order to evade paying higher taxes.
- Another thing that is done; they set a price of the product less in RRA systems and charge higher to the customer. For example, they set 1kg of rice in an EBM machine at 500Rwf/kg but when a client enters the shop, they negotiate and sell at 600Rwf/kg meaning that the 100Rwf/kg is profit and most clients don't mind about receipts.

  The general observation is that much as the dealers state that VAT may increase the final price, if other challenges as expressed by them are addressed, then the impact of VAT exemption removal will be minimized.

6.2 Recommendations

Based on the findings of the research, we recommend the following:

1. Depending on government policy orientation and based on the example of other countries, the Government could research the impact of selectively setting lower VAT rates than the current standard rate of 18% in order to promote certain sectors (among them agro-processing industries) based on their production processes, with careful consideration of the criteria for being called an industry;
2. The Rwanda Revenue Authority should put effort in discovering and controlling different ways used by taxpayers in agro-processing in order to evade paying taxes. This is because it was established that small operators use various techniques including disguising their shop sizes (operating capacities);
3. The Rwanda Revenue Authority should conduct a research on market prices for all products available on Rwandan market to establish the reality of prices set in Electronic Billing Machines by taxpayers;
4. The Rwanda Revenue Authority should accelerate and carry out audits for confirming declarations made by agro-processors and see why expenses are increasing.

6.3 Conclusion

The conducted study was aimed to analyze the impact of the removal of VAT exemptions on agro-processing industries and to derive a statistical measure of profit efficiency of agro-processing industries using a stochastic profit frontier approach. Descriptive statistics proved that trends of quantity imported, CIF and total customs taxes paid present fluctuations in all years studied. 2014, the year after the removal of VAT exemptions, was marked by a decline in net weight, CIF, quantity produced and sold compared to the previous years and the followed years. Regarding domestic taxes paid, the year 2014 was marked by a sharp increase with VAT dominating other taxes. The behavioral study for agro-processing industries showed that turnovers and cost of goods sold follow the same upward trend with an unexpected increase in 2012. However, they started reducing in 2014 and 85% of interviewed taxpayers said that the reduction was due to deceleration of sales caused by a high selling price resulting from the introduction of VAT on agro-processed products. Quantity produced and quantity sold declined in 2014. The use of a stochastic profit frontier showed that selling price and quantity sold are directly related to profit and cost of production reduces profit. The profit efficiencies vary moderately among industries, ranging from 16.67% to 83.33% with a mean of 70%. The level of mean efficiency estimate indicates that there exists some room to increase profit.

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