

Perceptions On The Impact Of Agricultural Mechanization For Aleu Addition And Beneficiation: As A Poverty Reduction Strategy In Zimbabwe's Smallholder Farming Communities, A Case Of Matetsi Area In Hwange District Matabeleland North Region

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Abstract: *An assessment on how smallholder farmers perceive the possible impact of agricultural mechanization for value addition to maximize producers' beneficiation was carried out in Matetsi area of Hwange district; Matabeleland north province. It is imperative that after the launch of the country's massive agrarian reforms and the initial mechanization of agronomic farm operations aimed at boosting agricultural productivity and production efficiencies in the newly fragmented farming units, mechanization for value addition and maximization of beneficiation became the missing link in advancing the livelihood of the new settlers. Seasonality in the production of most agricultural produce and lack of on-farm processing for value addition lead to minimal returns for the farmer, culminating in a situation where the majority of the farming households fail to break-even in most seasons hence forcing them to live in abject poverty and face critical food security challenges as alluded to by (FAO, 2007). For purposes of data collection a sample of 120 participants was randomly drawn from the ward's population of 1 186 (District Central Statistics Department, 2016). These comprised farmers, officers from Agritex Agriculture Research and Extension Services; government departments such as Ministry of Agricultural Engineering and Mechanization as well as officials from the Reserve Bank of Zimbabwe RBZ and NGOs Non-Governmental Organizations operating in the study area. A questionnaire aided by individual household interviews was used to generate data from the respondents. Data obtained was subjected to gross margin and product net-value analysis as well as descriptive statistics for purposes of presenting findings. The study revealed that farmers were against the notion that they remain producers of raw materials for industries located elsewhere; they felt that their integration in to the production chain as manufacturers would agitate the aggregation of a robust agricultural system which is cost effective and a necessity for sustainable and self-financing rural agriculture.*

Keywords: *Agricultural Mechanization, value addition, maximization of beneficiation, poverty reduction strategy & smallholder farming communities*

I. Introduction

Several studies in Zimbabwe have concentrated on describing the mechanization implementation strategies and the criteria upon which beneficiaries were selected; insignificant work has been done on the overall assessment of impact of agricultural mechanization for value addition to maximize beneficiation; as a poverty reduction strategy on marginalized smallholder farming communities. It is imperative that after the agrarian reforms and the initial mechanization of agronomic operations aimed at boosting agricultural productivity and production efficiencies, mechanization for value addition and beneficiation became the missing link on upgrading the living standards of the newly resettled farmers. This meant that the new occupants of the fragmented farm holdings remained confined to production and marketing of raw produce, which requires a lot of handling by middle-men and in the process the producer's share in the final price of the commodity, is minimal hence farmers fail to sustain their livelihoods. Seasonality in production of most agricultural produce and lack of on-farm processing for value addition leads to minimal returns for the farmer. The majority of the farming units are failing to break even forcing households to live in abject poverty and face critical food security challenges (FAO, 2007). This study therefore focused on establishing how both farmers—the resettlement beneficiaries and the traditional communal farmers view and describe the impacts of mechanization for value addition and beneficiation as a poverty reduction strategy and a vehicle for sustainable agricultural development.

II. Background

Since 2000 there have been major changes in the agrarian economy in Zimbabwe. Extensive poorly planned land redistribution and mechanization resulted in significant backward shifts in agricultural productivity (Obi and Chisango, 2010). Farm mechanization programme in Zimbabwe has been generally perceived to be synonymous to the use of tractor and other engine powered machines and equipment for carrying out mostly agronomic farm operations, undermining the pivotal role of machinery in the processing and manufacturing of various products from agricultural primary produce and on-farm value addition for optimal beneficiation. After years of economic growth before structural adjustment programs SAPs, Zimbabwe launched and tried a number of ad-hoc and retrogressive programs such as fast track land reform FTLR, mechanization, indigenization and community share ownership which fueled the country's trouncing of its economic base, which began to take a downturn trend affecting all facets of community life during the period. It is therefore paramount that after years of significant economic, environmental, socio-cultural, and historical degradation, thoughtful agricultural development and new approaches for community regeneration need to emerge through research, to transform the rural and resettlement areas into hive of activities, habitable and interesting places to live and work.

The goals of the agrarian reforms and initial mechanization programs though sounded noble never yielded desired results, as since 2000 food security conditions deteriorated and about 2.17 million people were severely affected, and the majority about 72% in rural and resettlement areas. High food insecurity persists in Zimbabwe in spite of improvements in agricultural production technologies and according to FAO, (2009) the majority of Zimbabweans continue to face serious unemployment, hunger and poverty which has spiraled out of control. The launch of the agrarian reforms should have marked a phase in Zimbabwe's agricultural industrial revolution which should have transformed the country into an industrial world power through incorporating the resettlement and rural populace in to the main stream of the economy via agro processing and manufacturing. Such could have been achieved through implementation of a mechanization program that encompasses agro-processing and manufacturing to enhance value addition and maximize farmers' beneficiation.

The issue of mechanization in fragmented newly resettlement farms however has been the center of controversy since the commencement of the fast track land reform program as preference was given to medium and large scale farms/ (A2s). Chisango and Obi, 2011 cited that apart from the fact that adoption of mechanical power has increased output significantly; subsequently farm incomes in the former farming systems declined drastically, hence numerous questions had to be answered with regard to its impact on boosting productivity and employment creation in established resettlement communities. As FTLR witnessed massive migration of skilled manpower from urban areas to new farming zones there is therefore an immediate need to search for answers to the questions, especially in the context of developing countries, whose economies are agro-based like Zimbabwe.

Mabuwa, (2014) says as a result of higher production and grater intensity of land cultivation proponents of farm mechanization argue that the increase in the labour requirements of certain activities such as post harvest operations for value addition and value chains have an offsetting effect on the amount of labour displaced from the agronomic farm operations. This implies that mechanization for value addition would alleviate the food and employment problems in the new farming zones and rural communities of Zimbabwe, a panacea for ZIMASET Zimbabwe agenda for sustainable economic transformation.

The smallholder agricultural sector plays an essential role in ensuring food security, economic growth and employment creation, therefore financing smallholder farmers becomes a vital undertaking for poverty reduction in developing countries especially those in Sub-Saharan, Africa. The sector is however characterised by lack of technical advice and investment for value addition and commercialization of the sector, which would further enhance food security at household, national and regional level (Made, 2012). There is evidence to show that smallholder farmers use land and other limited inputs availed to them just as efficiently as large scale farmers or A2s, hence justifying the need to finance and invest in the sector. Zimbabwean farmers as a result of the fast track land reform have small farm holdings and considering their economic status cannot afford gigantic machinery for their operations. Exacerbating the challenge is the unavailability of credit lines to support the initiated resettlement and mechanization programmes.

The current high cost of ownership of farm machinery in Zimbabwe, militates against the use of machinery by majority of the farmers who are poor and live in rural and resettlement areas. These pathetic situations, therefore, call for research to explore furthermore other possible alternatives of farm power systems which target value addition to boost employment creation in farming communities. It is generally perceived that farm mechanization/mechanical technology is considered as a form of technical change which may enhance agricultural output growth. This implies an upward shift in the local product curve of mechanized farms, a downward shift in the cost curve and downward pressure of casual labour employment due to factor substitution and consequently an upward curve in the agro-processing, manufacturing and distribution sectors/ value chains. Before the country's economy shifted its focus to mineral resources particularly diamond, agriculture was given the highest priority as the country's main poverty reduction strategy from diversified production, processing and

exports which created employment, increased family incomes, food security and people's livelihoods (World Bank, 2002). There is optimism in the potential of Zimbabwe's agricultural sector to be an engine of growth. The optimism is based on the country's abundant and underutilized land, water resources and labour force in rural and resettlement communities. Although Zimbabwe's agriculture sector has considerable untapped potential, it is characterized by financial challenges effected by the catastrophic liquidity crisis and numerous risks that constrain realization of the potential, hence the country remains more of an economic giant, but in a ditch.

The smallholder sector which accounts for over 70% of the country's agriculture faces unique constraints. These farmers derive most of their income from agriculture. There is a general lack of non-farm/agricultural income generating activities, hence the call for value addition to maximize beneficiation. Given the importance of agriculture to the livelihoods of these communities government's intervention will to a large extent determine effectiveness of mechanization for value addition as a poverty reduction strategy in rural communities.

A number of problems limit production, marketing, value addition of agricultural produce by the smallholder farmers. Production is characterized by low yields. Average yields of basic crops are inadequate to meet the needs of producers, either for direct consumption or for family consumption. Rural and resettlement areas have become synonymous to poor performance, poverty, hunger, environmental and land degradation. Experience of technocrats and stakeholders in developing planned demand driven mechanization programs need to be embraced as these prepare policy makers and parliamentarians to thoughtfully develop and regenerate their communities using sustainable agricultural principles. The mission being, agricultural mechanization for agro processing that quenches the thirst of the rural populace by facilitating sound agricultural development and employment creation innovations through mechanizing rural service centers for agro processing. It should, therefore be noted and appreciated that access to land on its own is not enough as a means of sustainable empowerment but has to be complemented by other initiatives that enable those with access to land to derive tangible value and benefits from the resource by way of agricultural manufacturing to generate better income levels hence the need to mechanize for value addition to maximize farmers' beneficiation.

2.1 Statement of the problem

The unemployment, poverty and starvation have reached crisis proportions in Zimbabwe. These are putting severe stress on individuals, households and communities and the government at large due to an increase in the number of people affected (Poverty Reduction Forum, 2003). These are a cause for great concern because they do not only affect elderly citizens, but also young and energetic adults in their economically productive years, who finally find themselves stranded after investing heavily on tertiary and university education. In farming areas, particularly in communal and resettlement areas, where levels of agricultural mechanization are low to accommodate agro-processing and manufacturing the active population is idle and even those skilled, who migrated from urban centers are highly underutilized hence spend greater part of their time on unproductive activities some of which society regards unacceptable. Such activities at times lead to drug abuse, alcoholism and prostitution leading to infection of youths by the deadly HIV/AIDS hence young farmers are dying prematurely with their agricultural knowledge, expertise and experience while cash resources are also being diverted from agricultural production to health seeking activities as cited by (James and Faleye 2015). It's against this backdrop, that the study examines people's perceptions on possible impacts of agricultural mechanization for value addition and beneficiation as a poverty reduction strategy in the smallholder farming communities of Zimbabwe, a Case of Matetsi area in Hwange district; Matabeleland north region

2.2 Objectives of the study

As can be drawn from the background above, the over-arching objective central to the study was to examine people's perceptions on possible impacts of agricultural mechanization for value addition on poverty reduction in the smallholder farming communities of Zimbabwe; however the specific objectives were;

- Identify the pivotal role of mechanization for value addition in the value chain of agricultural produce and cite its impact on farmers' levels of income from their ventures.
- Establish machinery and equipment types regarded critical in the previous government initiated mechanization programs and whether they were comprehensive enough, to cater for agro-processing and value addition in the stallholder farming communities.
- Evaluate what farmers perceive as necessary intervention strategies government and stakeholders can undertake to improve on mechanization levels for value addition to advance livelihoods in rural communities.

III. Methodology

The study was carried out in Hwange district; Matabeleland north province which is characterized with minimal, unpredictable rainfall and very hot temperatures hence has imperfect comparative advantage on agricultural activities particularly crop productivity as compared to other high rainfall ecological zones in the country. It was confined to Matetsi area in the northern part of the district where the predominant farming activity is extensive livestock production but with high risk of being falling prey to wildlife or predators. Small grains which are tolerant to drought and the harsh conditions experienced in the district constitute the staple diet of the inhabitants. Participants in the study comprised farmers, officers from Agritex Agriculture Research and Extension Services; government departments such as Ministry of Agricultural Engineering and Mechanization as well as officials from the Reserve Bank of Zimbabwe RBZ and NGOs Non-Governmental Organizations operating in the study area. A sample of 120 inclusive of all participants was randomly drawn from the ward's population of 1 186 (District Central Statistics Department, 2012). A questionnaire aided by individual household interviews was used to generate data from the respondents. Data obtained was subjected to gross margin and product net-value analysis as well as descriptive statistics for purposes of presenting findings. Gross margin and net-value analysis were adopted to evaluate and establish the worthiness of mechanizing the smallholder agricultural sector for processing and manufacturing as a way of evolving value addition of farm produce to maximize beneficiation for the rural farming communities.

IV. Results and Discussions

4.1 Mechanization for agro-processing and value addition; justification

Value Addition Illustrated (Cotton value chain)

product	value	Added value
1kg of cotton fibre	USD 1.85	
0.75kg of cotton yarn	USD 2.45	\$0.60
3 metres of cotton fabric	USD 6.50	\$4.50
3 cotton t-shirts	USD 12.00	\$5.50

Figure 4.1: Value addition of agricultural produce and its impact on farmers' levels of income
Source: Zimbabwe Textile Manufacturers Association (ZITMA), (2014)

Agro-processing and value addition

Traditionally Zimbabwean rural farmers are regarded primary producers in the agro-value chains who produce food materials which are consumed and marketed in the raw form. In such a homogenous chain it is the sole mandate of agro-industries located in urban centers to add value to the produce, and are regarded an essential component in the country's value chain systems. The study however established that the development of small-scale processing industries in rural communities would help add value close to the source of raw materials. Figure 4.1 above indicates that rural industrialization would benefit the rural communities by initiating the path towards commercialization of rural agriculture and orient it towards resuscitation and sustainability of rural economies. As illustrated above this would reduce the current high levels of income losses experienced by the farmers and volumes of waste of fresh produce due to multiple handling, as it is envisaged that the endeavor would encourage producers to participate in rural commercial activities through manufacturing hence realize better rewards from their produce.

4.2 Machinery and equipment prioritized in the previous government initiated mechanization programs

Table 4.1: Equipment Distributed under Phases 1 and 2 and Expectations for Phase 3 of Zimbabwe's agricultural mechanization program

Table 4.1.1: Mechanized equipment

Type of Equipment	Phase-1	Phase-2	Phase-3	Cumulative Total
Tractors	925	1 200	600	2 725
Ploughs	586	800	460	1 846
Harrows	463	800	470	1 733
Boom Sprayers	226	315	205	746
Fertilizer Spreaders	70	308	230	608
Planters	71	300	95	466
Combine Harvesters	35	50	20	105
Hay Balers	180	20	10	210

Table 4.1.2: Animal drawn equipment

Type of Equipment	Phase-2	Phase-3	Cumulative Total
Scotch Carts	45 000	33 000	78 000
Cultivators	20 000	26 200	46 200
Planters	1 000	1 000	2 000
Ploughs	50 000	50 000	100 000
Harrows	70 000	60 000	130 000
Knapsacks (Chemical Sprayers)	45 000	47 000	92 000
Chains (Figure covers up to Phase-5)	200 000	-	200,000

Source: Gono, (2008) RBZ Quarterly Report

Zimbabwe's initial mechanization programs premised on the fundamentals of enhancing national food security through increased agricultural production; and to increase the overall export potential of the country's farming community it was imperative that emphasis was on land tillage and agronomic machinery as depicted by table 4.1 above. The thrust to promote value addition and encourage specialization in the agro-chain through processing, branding and packaging for maximization of beneficiation was underestimated. Though the program was broadened to cater for not only the commercially oriented A2 farmers, but also geared towards empowering small holder farmers by availing to them locally produced animal drawn implements; the concept of bias to land productivity limited the program's potential in advancing sustainable rural livelihoods through maximization of farmers' beneficiation. It is therefore opined that a paradigm shift for future mechanization programs to refocus on value addition is a necessity.

2.3 Farmers' preferences on agro-processing machinery perceptions on necessary intervention strategies

Table 4.2: Response rate on preferences on agro-processing machinery ownership

Post-harvest/ Processing machinery	Respondents rate	Percentage %
Oil pressing machinery	40	33.3
Peanut butter grinding machinery	30	25
Grain de-hauler & grinding machinery	25	20.8
Beef&milk processing machinery	10	8.3
Packaging and branding machinery	15	12.5

Table 4.2 above demonstrates that the majority of the respondents constituting 33.3 % prefer oil pressing machinery which was cited to be cheaper as it requires reasonable initial capital investment as compared to other machinery options. Though peanut butter processing machinery had a high preference rate of 25% it was established that the area had a partial comparative advantage in the production of the raw material as their district was prone to drought rendering harvesting of the crop impossible. Grinding machinery for refined grain meal was perceived as a viable enterprise by 20.8 % of the respondents particularly male participants some of whom are already members of similar projects funded by non-governmental organisations in the area. Ten of the interviewed respondents constituting 8.3 % showed interest in beef and milk processing machinery. It was however established that the initial cost of the machinery was prohibitive to the resource poor farmers. Packaging and branding which accounted for 12.5% had quite a reasonable preference rate; respondents cited the need for branding as a strategic way of market penetration and out-compete competitors. The farmers showed that they were knowledgeable about the benefits of mechanisation for value addition which they say has the potential to boost the aggregate agricultural output.

V. Conclusions

An evaluation aimed at examining people's perceptions on possible impacts of agricultural mechanization on value addition and maximization of beneficiation as a poverty reduction strategy in the smallholder farming communities of Zimbabwe was carried out in Hwange district. The over-arching objective of the study was to investigate the role of mechanization for value addition in the value chains of agricultural produce and establish its impact on farmers' variation in levels of income from their ventures as a vehicle for the attainment of sustainable livelihoods in the marginalized rural communities. The study established that though the initial mechanization programs premised on the ideology of enhancing National food security through increased agricultural production particularly on beneficiaries of the fast track land reform FTLR, mechanization for value addition to maximize farmers' beneficiation was underestimated. Beneficiaries indicated that machinery availed was basically meant for tillage, input application and harvesting overlooking the significance of on-farm processing to boost the earnings of the local communities. It was noted that farmers were against the notion that they remain producers of raw materials for industries located in urban centers, they felt that their integration in to the production chain as manufacturers would reduce handling costs by middlemen and transport cost to processing zones in cities. Such would aggregate robust agricultural systems which are cost effective; a necessary condition for sustainable and self-financing rural agriculture as farmers generate high incomes and foreign currency from their exports. In light of the above, it is therefore beyond any reasonable doubt that mechanization for value addition to maximize farmers' beneficiation remains one of the main pillars through which Zimbabwe can consolidate its rural agriculture systems and elevate them to become a force to reckon with in the mainstream economy.

VI. Recommendations

The over-arching objective of the study was to investigate the role of mechanization for value addition in the value chains of agricultural produce and establish its impact on farmers' variations in levels of income from their ventures as a vehicle for the attainment of sustainable livelihoods in the marginalized rural communities. Based on the generated data and findings it is imperative that the study made the following recommendations:

- Government and stakeholders should regard mechanization for value addition as the main pillar upon which maximization of farmers' beneficiation can be achieved, it is therefore paramount that expeditious implementation of the program is necessary to consolidate the country's rural agriculture systems.
- Develop a comprehensive integrated agricultural mechanization strategy (AMS) and industry development strategy (AMIS) for the country's smallholder farming sector in all regions to synchronize production and manufacturing activities.
- Harmonization of skills training for extension officers, artisans and farmers on entrepreneurial skills to improve their understanding of the different power and mechanization options available for small-scale manufacturing to expose farmers to new technologies and opportunities.
- Government and stakeholders develop a demand driven and community based mechanization program for value addition arising from needs assessment as opposed to innovations which are imposed on communities.

- When planning for future mechanization programs it is also imperative that that planners/ policy makers should be informed about the important synergies between agriculture, manufacturing and the value chain systems so that a wholesome package is availed to farmers.
- A vibrant agricultural mechanization for the country's economic reforms need to be buttressed by a comprehensive Small and Medium Enterprises (SME) growth and development strategy to ensure that many of the locals are empowered.

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