

An insight into the macadamia nuts industry of Zimbabwe. Its history, current state and constraints

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Abstract: Little information is available on the macadamia nuts industry of Zimbabwe due to limited research in the area. This research unpacked the Zimbabwe macadamia nuts industry in terms of its origin and current outlook. The study gathered the required information through use of three search engines, which produced 28 articles rich in information in macadamia nuts industry of Zimbabwe. The search engines results revealed that Zimbabwe's macadamia nuts history dates back to 1965 when three farmers imported seedling material from Australia for planting and selling. A PECMAC factory transferred to Southdown Estates was processing the macadamia nuts producing oil, cracked nuts, butter and residues for marketing. When the Government of Zimbabwe embarked on the land reform programme this marked the entrance of A1 and A2 farmers into macadamia nuts farming which was by then was only common in Chipinge District. Establishment of macadamias has now spread to other districts of Manicaland province among them Chimanimani, Mutasa, Nyanga and Mutare and to other provinces like Mashonaland East and Mashonaland central. Although the country's National Export Strategy is basing on macadamia nuts to meet vision 2030, the government does not support the industry, which up to now has no research institute and is experiencing high cost of inputs. Currently macadamia nuts farmers mostly get support from buyers through contracts, which later put them at a disadvantage when the contractor buy their nuts at very low price. Policy regulation to support the industry are still not convincing with only statutory 38 of 2019 the only one in place. However, the statutory does not promote growth of the industry through agitating for value addition. The country is currently exporting nuts in shell and in the process losing millions of dollars. Zimbabwe export its macadamia nuts to Asia and South Africa with Europeans market still closed because of land reform disputes.

Key words: Macadamia nuts; Origin, Value addition; Supply chain.

I. INTRODUCTION

Zimbabwe is a land locked country found in South East Africa. Its border with Zambia is the Zambezi River and Limpopo River marks its boundary with South Africa whilst to the east it shares borderline with Mozambique and Botswana to the west. The country has an area of 390,757km square (<https://www.nationsonline.org/oneworld/zimbabwe.htm>).

Zimbabwe has five ecological regions based on the annual rainfall, temperature, agriculture potential of the soils and vegetation (Zimstats, 2017). It also possesses good agro-climatic conditions and large stretching arable lands, which provides opportunities for good agriculture productivity (ZEPARU, 2014). These diversified agro-climatic conditions

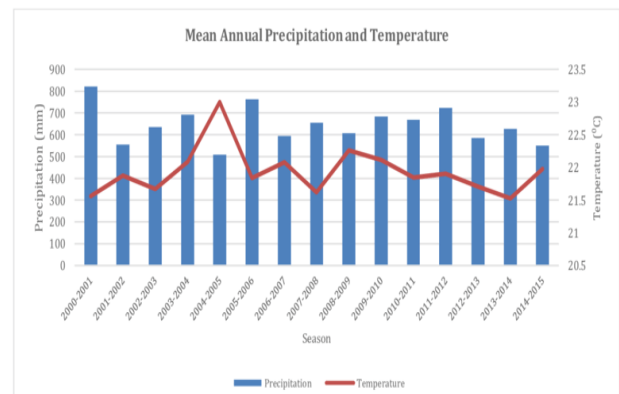
prevailing in the country allows farmers in the different regions to grow different crops (GoZ, 2012).

Rainfall and temperature patterns

Zimbabwe possesses a changing rainfall climate pattern considering the distribution pattern relative to time and places (Brazier, 2015) The country receives high rainfall and has high temperatures starting from October to March. The dry season coupled with low temperatures runs from June to August followed by the warm dry spell season, which progresses up to the start of October (World Bank Group., 2020). The Eastern and Northern areas located on high altitude usually experience low temperatures and rainfall above 1000mm/year. On the other hand, the Southern and Western areas located in the low-velld characterized by high temperature and low rainfall of around 350-450mm (Brazier, 2015).

According to Brazier (2015), Zimbabwe also experiences a common hazard of tropical cyclones, which cause very high rainfall with thunderstorm leading to hailstorms, floods and flash floods. In some instances, the country witness dry spells and droughts that may run for one to three years due to EL Nino Southern Oscillation (ENSO), which originates from the Pacific Ocean. Zimbabwe together with other Southern African nations Malawi and Mozambique experienced the worst cyclone in 2019. The storm named Cyclone IDAI was moving at a speed of 105Mph and it destroyed properties, animals, crops and caused loss of life. Below is Fig 2.3 showing Zimbabwe's mean annual precipitation and temperature (Reliefweb, 2020).

Fig 1: Zimbabwe's the mean annual precipitation and temperature



Source: Research gate.

Role of agriculture in Zimbabwe

According to FAO (2007), agriculture contributes towards economic development (source of income, reduction in poverty, food security) and non-economic roles (natural resources management, social cohesion and stability and culture preservation). World over, agriculture is the biggest catalyst of economic growth with its role in providing food security as observed in the 21st century (Masiyandima, et al., 2011). Agriculture contributes to economic growth thereby reducing poverty by twice the rate of growth it may have in a country whose economy is non-agriculture driven (World Bank, 2008).

In Zimbabwe, agriculture is central to the country's economy contributing 15-18% of Gross Domestic Product (GDP) (ZEPARU, 2014). About 40% of agricultural products are for export thereby generating foreign currency for the country and leaving 60% for the manufacturing industry (Zimstats 2017). Although Zimbabwe experienced a 12-year recession, which resulted in reduction in GDP by half, agriculture is still remains an important sector of the economy (Robertson, 2009). In 2016, Agriculture was the second contributor of foreign currency after mining, producing USD\$2, 12 billion out of the USD 2.8 billion realized by the country (ACER, 2017).

According to ZERAPU (2014), besides providing means of economic growth, agriculture also, provides food security and poverty reduction means in Zimbabwe. Close to 70% of the population in the country rely on agriculture and about 30% of people are have agriculture jobs (Zimstats, 2017). Agriculture is also a very good source of income for other people in Zimbabwe in that employment linked to agriculture constitutes a third of the formal labour force (MOA-Zimbabwe, 2012).

The Maputo Declaration of 2003 by the African Union Commission recommended member states to allocate at least 10% of their budget to the agricultural sector after realizing the significance of Agriculture in developing nations (GoZ, 2012).

Crop production in Zimbabwe

The main agricultural activities take place in summer. During this season, the country receives higher rainfall and temperatures will be good for plant growth i.e. maize, soya beans, and tobacco. In winter, temperatures will be low and there will be little or no rainfall. Winter crops are grown under irrigation i.e. wheat, barley and other horticulture crops (Gasana, et al., 2010). According to the GoZ (2018), the country currently has 210,000ha under irrigation with 17,500ha working. Government has put in place an irrigation master plan to construct new irrigations schemes and rehabilitate existing ones so as to cover 2,5 million hectares with irrigation. Zimbabwe has over 23 different food and cash crops (GoZ, 2012). Cash crop include tobacco, cotton, tea, coffee, sugarcane, soya beans, sunflower and horticultural crops (GoZ, 2012). The country's food requirement currently

stands at 1,918,727 tonnes of cereals per year with 568,725t for human consumption and 350,000t reserved for livestock production (APPRODEV,2002).

One important Zimbabwean cash crop that is now common in high rainfall areas with establishment expanding at an alarming rate is macadamias (Majuru, (2021). Signs are that it will be one of the country's important agriculture industry and a big foreign currency earner, which can be an attractive option to tobacco given the international pressure to ban smoking. It is therefore very crucial to make sure that the industry's origin and current state is available to those who need it and hence this study.

Justification

A Review of major studies in the macadamia nuts shows that researches in the macadamia nuts industry in Zimbabwe are very scarce. The researcher only managed to find a research on irrigation scheduling at Southdown Estate (Chinzou, 2018). This study will therefore tell the story about macadamia nuts in Zimbabwe, fill the research gap by providing answers to questions like how and when did the industry started and what progress has been made so far. The study will also provide adequate information on macadamias in Zimbabwe to all actors along the value chain and stakeholders to enable to make informed decisions that allow them to contribute towards maximizing the performance of the sector. It will also expose challenges faced by the industry and propose some recommendations to improve benefits realized from the industry.

Research method

Zimbabwe is one of the few African countries with macadamia nuts orchards. However, today very little information is available on Zimbabwean macadamia nuts industry because researches in the area are very few. In order to provide an insight in the country's macadamia nuts industry, a research based on available literature was analysed and consolidated. The research selected internationally accepted standards with clear search processes to get information on macadamia nuts industry in Zimbabwe. The first search terms were "Macadamia nuts industry in Zimbabwe-Origin and current state". The search terms used on three search engines, Google scholar, Web of science and Google search. The three search engines are relevant database in as far as the research topic is concerned. On the first search Google scholar produced 1,360 hits, Web of science had 11,834 results and Google search had 614,000 hits. A refined complex search followed using search words "Macadamia nuts industry in Zimbabwe". Under this new search, Google scholar revealed 820 hits, Web of science had 427 articles and Google search had 172,239 results. There was only 1 duplication resulting in 172,238 hits considered under inclusion and exclusion criteria. The inclusion and exclusion criteria were that the article should be rich in information capable of giving origin of macadamia nuts in Zimbabwe or the current state of the industry whether positive or negative.

The inclusion was also restricted to articles in English. The process screened 172,210 articles leaving 28 results for analysis to get information on the Zimbabwean macadamia nuts industry's origin and current state. The selected research articles with adequate information on the macadamia nuts industry in Zimbabwe was composed of 27 articles and 1 journal. A combination of information from these different articles was adequate to tell the story of macadamia nuts industry of Zimbabwe.

The history of macadamia nuts in Zimbabwe

According to International Nut and Dried Fruit Council (INC) (2002), over 40 developed and less developed countries produce macadamia nuts and under these conditions, millions of hectares are under macadamia nuts orchards. Worldwide, macadamia nuts have transformed the lives of several thousand people who are either smallholder or large-scale macadamia farmers. Zimbabwe has abundant land with conducive climatic conditions, which are good for macadamia nuts production (Majuru, 2019). Establishment of macadamias nuts plantations in Zimbabwe started in 1965 when Arther, Anne Lane and Ted Tong established macadamia nurseries for their orchards and for sale. The three imported seedling materials from Australia and California and later realized that Hawaii had improved varieties (Stones, 1998).

After some time, the macadamia nuts farmers organized a symposium on macadamias. The symposium provided a lot of information on macadamia nuts farming and this increased farmer's interest on macadamia nuts plantations. When macadamia nuts were first introduced in districts like Chipinge they were inter-planted with coffee to compliment other agriculture activities like tea, coffee, dairy and tobacco farming. The farmers went on to establish an association for levying macadamia nuts farmers followed by a steering committee. Ted Tonks was the Chairman and the other

members of the committee were Maz Marzorati, Sir Malcolm Barrow, Ken Cross, Arthur Lane and Hugh Boswell Brown. The committee established PECMAC (PECans and MACadamias) Nut Company (PVT) LTD with shares allocated to farmers at \$1 each. Under the arrangement, a farmer could only buy shares proportional to his number of trees. In 1991/2, the machinery and factory moved to Chipinge where the company operated as a PECMAC, a subsidiary of Southdown holdings (Stones, 1998).

The farmers had many varieties to choose from among them 246,333,660,741,800,344,791,508 and 788. However, there was no macadamia nuts research institution in Zimbabwe and most farmers relied on limited information from Malawi, Australia and farmer-to-farmer discussions. This made it difficult for new varieties to come by in the country. After some time, a few new varieties 344, 800, 741 and 791 were available for planting. Belmont and tetraphylla macadamia species were also available covering only small hectares. The tetraphylla specie was mainly for propagation/grafting. A few growers had their nurseries and could produce their own seedling and surplus for small growers through propagation of seed, grafting and vegetative propagation (Stones, 1998). Farmers entered in contract contracts with PECMAC to enable macadamia nuts processing for the export and local markets with costs recovered after marketing. During that time, macadamia nuts harvesting was by hand. Harvesting would start in November, ended in July/August. The quality of nuts depended mainly on insects control especially borer and bugs. The nuts were dehusked within 24hrs of harvesting, sorted using water with drying done using shade ambient, tobacco moldro barns, coffee drying troughs or tea weathering troughs. The processed nuts would find their way to Canada, Europe and Australia. The non-export kernels were roasted, salted and packed for sale. The factory also produced oil, Mac butter and residues for marketing.

Table 1: PECMSC production and marketing of different products from the nuts

year	cracked	Kernel	crack out	Quality	Export	local	Blemished	oil	butter	residues
1993	155989	45932	29.4%	-	-	-	-	-	-	-
1994	271959	77856	28.6%	-	26380	25556	25920	12385	893	1001
1995	374508	110737	29.6%	65%	64058	27259	7500	5918	1420	1354
1996	346786	102317	29.5%	61%	63950	16773	11774	2708	1420	1275
1997	337075	98495	29.2%	59%	28900	28900	11374	4279	1773	4732
1998	396000	-	-	-	-	-	-	-	-	-

Source: Stones, 1998.

The Land Reform Programme and macadamia nuts

In the 1990s, Zimbabwe's agriculture sector comprised of large-scale commercial and small-scale farming sectors. Commercial farms consisted of 4500 farms each having 2500ha on average (Rukuni, 1994). In the year 2000, the government of Zimbabwe started the land reform program where land was redistributed thereby creating small-scale

farmers who together with communal farmers became primary agriculture producers (USAID, 2015). The Fast Track Land Reform Programme (FTLRP) created A1 and A2 farmers in place of the large-scale commercial farmers with A1 having less than 10ha and A2 have over 10ha (ACER, 2017). Today, smallholder farmers now have 70% of agriculture land and this restructuring created 145,000 A1 farmers and 18,000 A2 farmers resulting in 1,3 million smallholder farmers if

communal and resettled farmers are included (GoZ, 2018). The newly resettled A1 and A2 farmers joined commercial farmers in growing macadamia nuts, which is now one of the fast-growing cash crops in Zimbabwe (Wamuccii, 2021). The new farmers entered into Macadamia nuts farming around 2010 in Chipinge District and have now expanded to the eastern highlands where farmers left coffee farming due to its low prices (Maodza, 2020). According to newZWire (2019) in 2018, coffee production reduced from 2000ha to only 630ha as farmers opted to grow macadamia nuts.

Macadamia nuts industry in Zimbabwe

In Zimbabwe 95% of macadamias are under dry land farming leaving only 5% under irrigation (Maodza, 2020). The varieties mostly grown in Zimbabwe are Beaumont and Intergrifolia (Agricultural Marketing Authority (AMA), 2021). The Macadamias are very common in Chipinge district where ideal climatic conditions for the orchards are in place. Farmers from other districts like Chimanimani, Nyanga and Honde valley have also joined macadamia nuts farming due to their good returns (Maodza, 2020).

Establishment of the macadamia nuts has now spread to other provinces like Mashonaland East and Mashonaland Central with 961 farmers registered to grow macadamia nuts countrywide by 2019 AMA (2021). In Mashonaland East, Marondera University of Agricultural Sciences and Technology (MUAST) got the mandate to chair the taskforce responsible for introducing macadamia nuts in the province. The taskforce consists of Horticulture Research Institute (HRI), Kushinga Phikelela National Farmers Training College (KPNFTC), Kushinga Phikelela Polytechnic College, Ministry of Industry and Commerce, Agricultural Marketing Authority (AMA), AGRITEX (Agriculture Research and Technical Extension), Forestry Commission and the War Veterans Association. The project got the green light after the Horticulture Research Council had carried a feasibility study of the project, which yielded positive results. The province's main target is to improve livelihoods of people and use the orchards as an afforestation project (<https://muast.ac.zw>). By 2018, the macadamia nuts orchards covered about 5,000ha with mature trees producing an average of 3-4t/ha although the country has potential to produce around 8-12t per ha if best management practice is put on the orchard. (ZimTrade, 2018).

Currently, the biggest producer of macadamia nuts in Zimbabwe is Ariston holdings (ariston.co.zw, 2020). Tanganda Company, a firm that was specializing in tea has now diversified into avocado and macadamia nuts. By 2020, the company had established 779ha of macadamia nuts and the company's top management believes project could offer them with sustainability and welfare for their over 5500 workers (Sibanda, 2019). Other commercial producers include Buzi Tea Company and Makandi. Wattle Company, which is into timber, is also eyeing macadamia nuts (postonsunday.co.zw).

Establishment costs and quality of nuts

According to Zimtrade (2018), the Zimbabwean macadamia nuts producers have gained adequate knowledge on macadamia production. However, they need to improve on working together and sharing information to continue producing high quality nuts. Harvesting of Beaumont nuts in Zimbabwe starts in March with nuts falling on the ground or the tree is shaken to release the nuts, which are then handpicked (Business Chronicle, 2012). According to Majuru (2019), macadamia production and expansion in Zimbabwe has many challenges among them high cost of seedlings, lack of irrigation infrastructure, poor storage facilities and lack of research on best varieties for the country.

Marketing of macadamia nuts

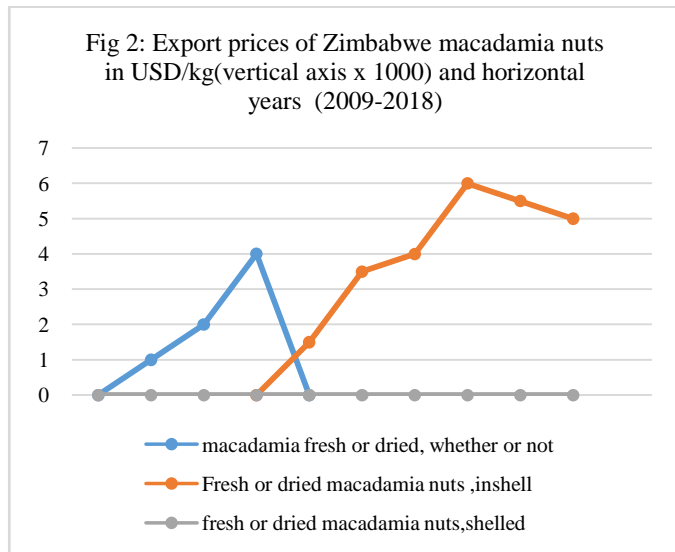
According to Zinyuke (2018), small-scale macadamia farmers sell their macadamia nuts to intermediaries who do not give them value for money on their nuts. The buyers include Dexing a Chinese owned company, Parrogate an Indian owned company, Cropate Agricultural Services and Premium Nut Company. The companies buy macadamia nuts at very low prices ranging from USD1.50 –USD2/kg and export them to countries like China where they get better prices (Maodza, 2020).

According to Maodza (2020), macadamia nuts have potential to produce foreign currency for the country, but this has failed to due to lack of good markets. Zimbabwe was rated number six exporter of macadamia nuts in the world in 2019 and still has capacity to improve on its export (Sibanda 2019). European direct markets have been difficult to get as the new farmers are cultivating on disputed land given to them under FTLRP leaving them with Asian and South Africa markets (Maodza, 2020). In Zimbabwe, macadamia nuts are exported under three categories (Selina Wamuccii, 2021) i.e.

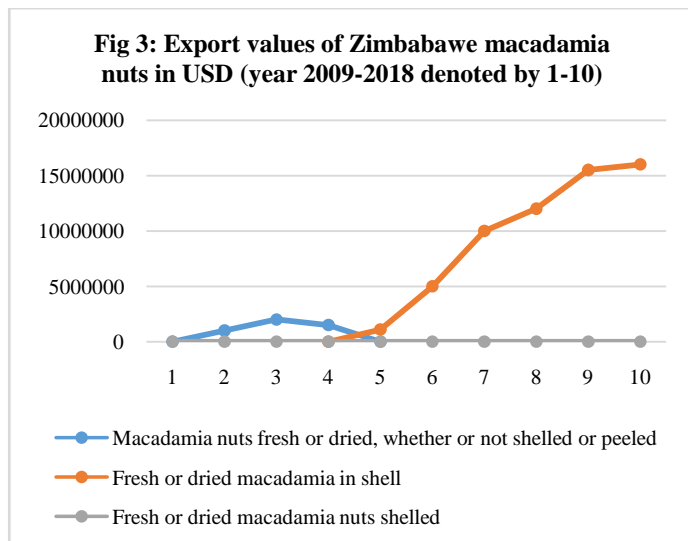
- i) Macadamia nuts, fresh or dried, whether or not shelled or peeled (HS code 080260)
- ii) Fresh or dried macadamia nuts, shelled (HS code 080262)
- iii) Fresh or dried macadamia nuts in shell (HS code 080261)

The country exported nuts in shell worth around USD4, 2 million (out of World's 317 million) in 2012 (DAFF, 2012). In 2016, the country exported macadamia nuts valued US\$15.56 million, which was an 8.26% increase from 2015 where US\$14.27 came from the exports. In 2018, Zimbabwe sold 4,879mt of macadamia nuts, which was a 0.14% increase from 2017 sales. Overall macadamia nuts exports registered a 34.41% growth between 2015 and 2018, where USD15, 56 million worth of export value entered the country's economy whose global export share was 4.9% (Wamuccii, 2021). In 2019, the country realized USD20.6 million from the sale of macadamia nuts which again was an increase from USD15.56million obtained in 2016 (Chigwere, 2020). The country's National Export Strategy is basing on macadamia nuts as its horticulture crop, which could increase export

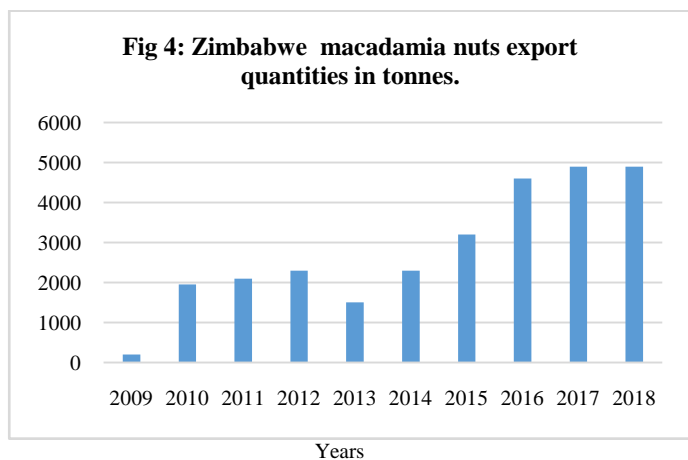
growth with US\$30 million target by 2023 and US\$52 million target by 2030.



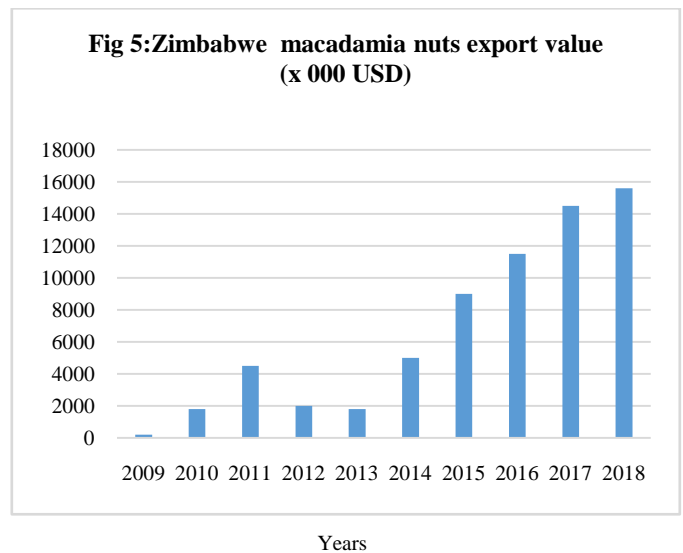
Source: Selina Wamucii, 2021.



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Financing of macadamia farmers

According to United States International Trade Commission (USITC) (1998), when establishing a macadamia orchard, money is required to prepare land, buy seedlings, buy equipment and set irrigation. In Zimbabwe, seedling cost a substantial amount of the establishment cost and because most farmers rely on external assistance to establish macadamia orchards. Macadamia Empowerment Group Association (MEGA) is one such group, which has been assisting farmers. The group has facilitated purchasing of affordable seedlings for farmers and this has resulted in over 300 new small-scale farmers establishing macadamia nuts between 2020 and 2021 (Zhakata, 2021). Individual farmers also have their nurseries, which produce good seedlings for selling to other farmers. One such farm is Avomac farm with which possesses 117ha of macadamia nuts. The farm has established an out-grower scheme where it contracts newcomers in macadamia nuts farming for a period of 20 years. The farm provides everything from tillage, seedlings, chemicals and harvesting (<https://postonsunday.co.zw>). According to Maodzwa (2020), macadamia farmers have not received any support from the government even though the central bank (RBZ) now recognises the macadamia nuts as a foreign currency earner. Most farmers are getting assistance from foreign companies who later buy their nuts under an arrangement where the farmer does not have power to negotiate price. The deal is a raw deal to a farmer who ends up getting average prices of around USD2,50/kg even if the nuts are of very good quality.

Policy regulations

The government of Zimbabwe through Ministry of Lands, Water, Climate and Rural Resettlement in terms of section 50 of the Agriculture Marketing Authority (AMA) ACT (Chapter 18:24) released macadamia nuts regulations under statutory 138 of 2019. Under the statutory, the Government recognized the existence of Association of Macadamia

producers and AMA as the responsible authorities for the macadamia nuts (GoZ, 2019).

Objectives

- 1) Control and regulate the marketing of macadamia nuts.
- 2) Promote, protect and maintain the sale of macadamia nuts.
- 3) Institute effective systems to control theft of macadamia nuts.
- 4) Collate statistics relating to the production, marketing, export and consumption or use of macadamia nuts.
- 5) Distribute market studies and information relating to the marketing, production and use of macadamia nuts.
- 6) Advise the Minister on all matters relating to the production, marketing and processing of macadamia nuts.
- 7) Do all things which this or any other Act or any other enactment requires shall be done by the Authority? (GoZ, 2019).

Registration-Anyone who wants to grow, buy, process macadamia nuts should be registered with the authority and get registration number for transacting in macadamia nuts.

Licenses-The authority also give licenses and permits to buyers, processes or export nuts after paying fees (GoZ, 2019).

Table 2: Fees for registration

Item	Amount (RTGs)
Application fees	50
Registration grower	10
Issue fee buyer/processes	500
Renewal	100

Levies - All buyers to pay a levy at a rate of 15 per cent of the value of the purchased nuts. This levy will be for developing the macadamia industry through

- (a) Farmers access to information on macadamia nuts production, marketing and processing.
- (b) the provision of research, training and extension services.
- (c) Pest and disease control.
- (d) Production, marketing, and processing of macadamia nuts.
- (e) The institution of effective systems to control theft of macadamia nuts (GoZ, 2019).

Table 3: Fees for permits and levy

Item	Amount (RTGs)
Late submission of processor and buyer licence /permit	10/day
Levy	15 per centum of purchase
Permit/license fee	1,000

Fixed prices-If the Minister concludes that there is unfair practice on pricing, he may fix minimum price of the macadamia nuts that year before 31 December each year by an order published in the Gazette.

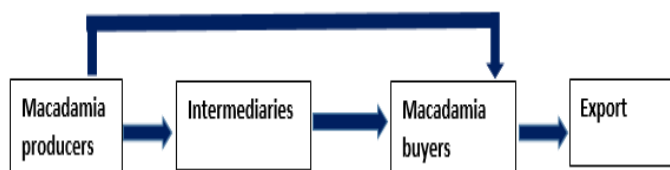
Offences and penalties-Anyone who

- (a) Buys, trades, receives, processes or grows macadamia nuts without a valid registration number or licence or permit.
- (b) Buys, receives, transports, processes, possesses or trades macadamia nuts (i) knowing that such macadamia nuts have been unlawfully acquired; or (ii) realising that there is a real risk or possibility that the other transacting party has not lawfully acquired such macadamia nuts.
- (c) contravenes any of the provisions shall be guilty of an offence and liable to a fine not exceeding level 4 or imprisonment not exceeding three months or to both such fine and such imprisonment (GoZ, 2019).

Actors in the macadamia supply chain in Zimbabwe

Around 1990s, macadamia nuts produced in Zimbabwe were value added at PECMAC factory a subsidiary of Southdown holdings producing oil, butter, residues and cracked nuts for export. There was value addition involving many actors resulting in the supply chain being long (Stone, 1998). Under the Second Republic, the Zimbabwean Government through NDS1 (2021 to 2025) aim to minimize export of primary commodities, by concentrating on value addition and beneficiation. This is supposed to change the country’s economic structure from one that exports raw commodities to one that exports high valued processed goods (GoZ, 2020). To achieve this, government has prioritized agro-industry value chains, under soya bean value chain, fertilizer value chain, cotton value chain, sugar cane fuel value chain, dairy value chain and leather value chain (GoZ, 2020). The macadamia nuts are not on the priority list of proposed agriculture produce that must be value added. Macadamia nuts are considered a good alternative to tobacco in terms of foreign currency generation in Zimbabwe if tobacco is banned. In Zimbabwe there is no value addition and the nuts are exported as nuts in shell resulting in a short supply chain and loss of foreign currency (Majuru, 2020).

Fig 6: Supply chain of macadamia nuts in Zimbabwe.



The industry has various supporters each with a role to play in the supply chain. Among the supporters are AMA, Macadamia Association of Zimbabwe, Agritex and ZimTrade

AMA- Active in searching buyers, registration of growers and buyers and processing of permits. The organisation is also

involved in organizing workshops and training farmers (GoZ, 2019)

Macadamia Association of Zimbabwe- Represent farmers and is also involved in vetting buyers and provision of technical services, facilitate macadamia nuts security and training of farmers together with AMA (Kadzere, 2021).

Agritex- Provision of extension services to farmers.

Coffee Research Institute- Provision of seedlings to farmers.

ZimTrade- Facilitate export of macadamia nuts and giving advice to farmers (Kadzere, 2021).

NGOs- Facilitating expansion of orchards though sourcing cheaper seedlings and sometimes providing them to farmers free of charge.

Training

An important aspect of improving the quantity and quality of macadamia nuts is to meet the training needs for farmers. Training equips farmers with good farming practice, which eventually will result in improved quality and quantity of the nuts. In 2021, AMA partnered with Macadamia Association of Zimbabwe to train farmers in Manicaland and Mashonaland province under the theme “Sustainability of Macadamia nuts Production”. The training covered aspects of nursery establishment, maintenance of orchards, harvesting and marketing of nuts (AMA, 2021). According to Kadzere (2021), ZimTrade together with AMA also facilitated workshops for farmers on marketing to educate farmers on how to choose the appropriate market for their macadamia nuts.

Challenges in the macadamia nuts business

Macadamia nuts are now a cash crop to several small-scale farmers in some districts of Zimbabwe. The farmers may possess as little as 20 trees with a single tree producing around 20kg of macadamia nuts per season (Zinyuke, 2018). In 2019, macadamia nuts production in Zimbabwe was very poor due to climate change, which brought in heat waves together with poor rains. This mostly affected plantation that were not under irrigation causing them to lose flowers in between August and November. Even those farmers who were using irrigation witnessed reduced yields of about 5t/ha whilst dryland yield was around 2-3t/ha for big farmers (Maodza, 2020). In 2020, the area covered by macadamia orchards increased to 9225ha from 7300ha in 2019 and because of that total production was supposed to increase by 44% from 433,000t in 2019 to 620,000t in 2020. However, this was not the case as yield was poor mainly due to lack of inputs (Food Business Africa News, 2019).

The Corona virus pandemic has also limited the number of buyers for macadamia nuts in Zimbabwe and this resulted in less competition. The few buyers connive to fix low prices and farmers end up selling their nuts at a give-away price. Lack of drying plants and modern equipment are also a

challenge to farmers. Inputs like fertilizers, chemicals are not readily available in Zimbabwe and most farmers buy them from South Africa (<http://postonsundsy.co.zw>; Kadzere, 2021).

According to (Majuru, 2021) if most farmers establish macadamia orchards and are provided with adequate support by research organizations and government, the macadamia sector can bring more foreign currency by 2032 and this will help in transforming the economy into a multi-billion dollar sector as targeted in the Agriculture Recovery Plan and Agriculture and Food Systems Transformation Strategy of Zimbabwe. There is no research currently taking place in Zimbabwe to introduce new varieties that are suitable to the country’s climatic conditions and so quality and quality issues will continue to haunt the country.

The macadamia nuts industry in Zimbabwe is also enduring black market effects. The industry has witnessed organized crimes with syndicates who are dealing in stolen macadamias. The country recorded several incidents in which farmers and thieves clashes turned fierce. The macadamia black market is out of control to the extent that those stolen from other neighbouring countries find their way to the international market through Zimbabwe (Bega, 2020).

II. CONCLUSION

It is evident that the macadamia industry in Zimbabwe is still at its infant stage when compared to other African countries like Kenya, Malawi and South Africa. The growth of the industry has been very slow given the fact that it started in 1965. This is attributed to lack of tangible support from the government. The country does not have a macadamia research institution and extension knowledge is limited. Seedlings are expensive with some farmers charging usd5 per seedling. Moreover, there is shortage of macadamia nuts inputs in the country with inputs like fertilizer and chemicals imported from South Africa and end up being unaffordable to small farmers. The Government has made several interventions in the agriculture sector by coming up with different facilities to support production of certain crops like maize, tobacco, soya beans, cotton, wheat and livestock production. This has been done under various facilities, i.e. Command Agriculture, The Grain Mobilization programme, Agricultural Sector productivity Enhancement facility (ASPEF), Mechanization programme, Tobacco revolving fund, Presidential Input scheme, GMB Input Scheme and Operation Maguta (International Institute for Sustainable development (IISD), 2009; GoZ,2017). Macadamia nuts have not been included for funding under any of the government funding programmes.

In 2019, the Government through Ministry of Lands, Water, Climate and Rural Resettlement came up with the first policy regulation in macadamia nuts, statutory 138 of 2019. However, this statutory leaves many grey areas, which needs regularization in order to make the industry viable. It does not spell the duties of AMA and the Macadamia nuts Association of Zimbabwe and no funding modalities are in place for the Association to run smoothly. Furthermore, it failed to provide

means to promote local industry through agitating for value addition in the macadamia industry. This means the country will continue to lose millions of dollars by exporting nuts in shell.

Harvesting of nuts is uncontrolled under the current regulations. This means farmers willingly harvest as and when they want and may even harvest early if buyers dangle some money. Harvesting of immature nuts is a loss to the farmer and the country at large. Between 1993 and 1998, the country was value adding its macadamia nuts producing oil, butter and residues for marketing. However, there has been a change now with Zimbabwe currently exporting nuts in shell with no value addition at all. This is an issue of concern, which shows that the industry has taken steps backwards.

III. RECOMMENDATIONS

The Government need to come up with clear policies that support macadamia nuts given their high margins and the ever-increasing demand. The policies should ensure support for farmers in all aspects. Knowing the benefits derived from macadamia nuts, the Government is supposed to take a leading role in ensuring that the farmers get seedlings, fertilizer and chemicals at affordable prices. This allows more and more farmers to own macadamia nuts orchards thereby reducing black marketing in the macadamia industry. Given that the growing of tobacco which is the country's highest foreign currency earner is under threat from the Framework Conversion of Tobacco control which was effected in February 2015, macadamia nuts is the alternative to tobacco in terms of foreign currency generation especially if the industry is backed by research and government assistance.

It is now high time for the country to establish a macadamia research institution. A research institution in macadamia nuts is key if the country needs to improve quality and quality of nuts produced. Research institution will go a long way in making sure that farmers get good varieties that are suitable for our climatic conditions. Extension services are one critical element that is important in macadamia nuts business. This is because most farmers in the macadamia nuts are newly resettled farmers who still need guidance to reduce high rejection rates. Training of extension workers and farmers is therefore very crucial to maintain quality and increase yields.

Considering the difference in prices between in-shell nuts and cracked nuts, the Government was supposed to be concerned and work towards promoting value chain in macadamia nuts through coming up with policies that promote building of local macadamia nuts industries. Some countries like have banned export of nut in shell (banned export of nuts in shell). Thus, government should also enact policies that ensure value addition. Value addition allows the country to develop industries through foreign direct investment thereby creating employment to the locals. Both the farmers and the country are poised to get more through export of value-added macadamia nuts.

Considering the rampant theft in the macadamia industry in Zimbabwe, it is vital that the government introduce regulations that counter the scourge. The current regulation limits the theft punishment not to exceed level 4 or imprisonment not exceeding three months. This regulation does not consider the value of stolen nuts and hence there is a mismatch. Theft leads to harvesting of immature nuts, which fetches less on the market.

REFERENCES

- [1] ACER (2017). Promoting inclusive growth through competition regulation. The case of tobacco, cotton and cattle marketing in Zimbabwe. Harare.
- [2] AMA. (2021). Collective effort vital in macadamia nuts production. Word from the market. with AMA. The Sunday Mail.
- [3] APRODEV. (200). Women in Zimbabwe issues in future trade negotiations with the European Union., Harare.
- [4] Ariston Holdings. (2020). Ariston.co.zw. <http://www.ariston.zw>
- [5] Bega, S. (2020). Black market in macadamia nuts and avocados booming as crime syndicate take root. The Herald.
- [6] Brazier, A. (2015). Climate change Zimbabwe. Facts for planners and decision makers. Harare: Konrad Adenauer Stiftung.
- [7] Business Chronicle. (2012). Macadamia nuts the little known cash crop., Bulawayo: The Chronicle.
- [8] Chigwere, I. (2020). ZimTrade to drive macadamia export, Harare. The Herald.
- [9] Chinzou, M. (2018). Irrigation scheduling in macadamia production in Chipinge-Zimbabwe
- [10] DAFF, 2012. Market profile of the Southern African Macadamia nuts-South Africa.
- [11] FAO. (2006). Commodity and trade proceedings ,Governance ,Coordination and Distributions along Commodity value chain.
- [12] FAO. (2007). Socio-Economic Analysis of policy implications of the roles of Agriculture in Developing countries. The roles of Agriculture in development policies implications and guidance. Rome, Italy.
- [13] Food Business Africa News. (2019). Macadamia production in Zimbabwe forecasted to rise by 44%.
- [14] Gasana, K. et al. (2010). Evaluation of FAO cooperation in Zimbabwe 2006-2010. Rome.
- [15] GoZ, 2012. Comprehensive agricultural policy framework (2012-2032). Harare.
- [16] GoZ. (2012). The future we want. Report to the United Nations Conference on Sustainable Development. Harare.
- [17] GoZ. (2014). Value addition in raw materials and agricultural exports from Zimbabwe., Harare.
- [18] GoZ. (2017). Parliament of Zimbabwe-National Assembly. Harare.
- [19] GoZ. 2018. Towards an upper middle income economy by 2030. Harare.
- [20] GoZ. (2019). Statutory 138 of 2019. Agricultural Marketing Authority (Macadamia Nuts) Regulations. Harare. <https://www.nationsonline.org/oneworld/zimbabwe.htm>. <https://www.postonsunday.co.zw>. (2021). Farmers in Manicaland switch to macadamia nuts.
- [21] IISD. (2009). Trade knowledge network-Agriculture future scenarios for Southern Africa. A case study of Zimbabwe's food security. Harare.
- [22] IINC. (2002). General information.
- [23] Majuru, A. (2019). Macadamia nuts offer export opportunities for Zimbabwe, Harare. The Sunday Mail.
- [24] Majuru, A. (2021). Trade focus, Harare. The Sunday Mail.
- [25] Maodza, T. (2020). Macadamia farmers bemoan EU snub. Harare. The Herald.
- [26] Maodza, T. (2020). Poor macadamia harvest expected ,climate change cited. Harare. The Herald.
- [27] Masiyandima, N. et al. (2011). Sustainable financing options for agriculture in Zimbabwe. Harare.

- [28] MOA-Zimbabwe. (2012). Importance and contribution of agriculture to Zimbabwean economy.
- [29] NewZWire. (2020). Zim farmers put down the coffee for macadamia nuts.
- [30] Reliefweb (2020). Zimbabwe: Tropical cyclone Idai. Final report-<https://www.reliefweb.com>
- [31] Robertson, J. (2009). The Zimbabwean economy, where from to here. Harare.
- [32] Rukuni, C. (1994). The prime movers of Zimbabwe's Agricultural revolution. In Zimbabwe Agricultural revolution, eds. Rukuni M, and Eicher, C.K. Harare. University of Zimbabwe.
- [33] Sibanda, N. (2019). Tanganda cashes in on macadamia nuts. Harare. The Sunday mail.
- [34] Stone, R. (1988). Zimbabwe Macadamia. The Tree Nut Producer Association of Zimbabwe. Harare. The Tree Nut Producer Association of Zimbabwe.
- [35] USAID. (2015). Zimbabwe agriculture income and employment. Harare.
- [36] USITC. (1998). Macadamia nuts: Economic and competitive factors affecting the U.S Industry. Washington D.C. USA Government.
- [37] Wamucii, S. (2021). Buy Zimbabwe macadamia nuts directly from exporters and suppliers-Best of 2021 market prices. <https://www.selinawamuchii.com>
- [39] World Bank (2008). Agriculture for development. Washington DC.
- [38] World Bank Group. (2020). Climate change knowledge portal for development practitioners and policy makers-country Zimbabwe. Harare.
- [39] ZEPARU. (2014). Agro-industries /Food and beverages value chain diagnostic study. Harare.
- [40] Zimstats. 2017. Zimbabwe smallholder agricultural productivity survey, Harare.
- [41] ZimTrade. 2018. Collaboration is next step for Zimbabwe's macadamia growers. Harare.
- [42] Zinyuke, R. (2018). Macadamia nuts: Chipinge gold mine, Mutare: Manica post.
- [43] Zhakata, W. (2021). 300 new farmers venture into macadamia farming. Manica Post.