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An Analysis of Governmental Policies in Agriculture: The Case of Cashew Supply Chain in Mozambique

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Abstract

This thesis analyzes how the Mozambican government can implement policies to support cashew farmers. To achieve these conclusions, insights on the country's cashew value chain were obtained during a 3-month internship at an international project, which operates at a local level. Building upon that experience, research was done on the topic of agricultural policies, which was then used to evaluate Mozambique's current governmental action. Finally, a new set of policies was proposed, with the goal of benefitting cashew farmers' well-being.

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Key Words: Sustainability; Supply Chain Management; Mozambique; Social Impact; Sustainable Agriculture; Cashew; Agricultural Policies; Smallholder Farmers; Developing Countries

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Introduction

The agricultural sector is fundamental for the economy of developing countries and their population's livelihood. To understand its economic importance, one can see that in Low-Income Countries, according to the World Bank's classification, the value-added in agriculture as a percentage of GDP was at an average of 28.19% in 2020 (The Global Economy n.d.). This value represents the net output of the sector after summing all outputs and subtracting intermediate inputs. In these countries, agriculture also plays a critical role in people's lives, which can be further seen using World Bank data: In Sub-Saharan Africa, South Asia, and Latin America, over 50% of poor working adults (income below \$3.10 per day) work in agriculture (Castañeda, et al. 2016).

Despite the economic and social relevance of the sector, farmers in developing countries live in poverty. Most of this population relies on agriculture for both subsistence and commercial purposes, usually owning small properties where the family works to produce a wide variety of goods (Rapsomanikis 2015). According to FAO, smallholders are small-scale farmers, pastoralists, forest keepers, fishers who manage areas varying from less than one hectare to 10 hectares. Smallholders are driven by family-focused motives such as favoring the stability of the farm household system, using mainly family labor for production, and using part of the products for family consumption. Although agricultural censuses are infrequent in developing countries, data indicates that the average size of farms has been declining in these countries and, consequently, the number of small farms has been increasing compared to the number of large commercial farms. This can be a challenge since research shows that there is an inverse universal relationship between farm size and productivity. Smallholder families are usually numerous and live in remote places with limited access to electricity, telephone, sanitation, or even water. These factors bring severe consequences for the business where access to markets becomes a challenge and commodities' price arises due to transportation constraints and costs.

Furthermore, their living conditions also harm the health of the smallholders since the lack of sanitation and water can lead to several diseases and undernutrition problems. When compared to large commercial farms, these smallholder farmers need subsistence resources which incentivizes the production of a wider variety of species for diet diversification purposes. Regarding the capital used in small farms in developing countries, human labor is the most relevant factor, provided mainly by family members, where women are commonly more involved than men (Regmi and Weber 2000). The productivity of small farms can differ significantly across countries depending on the access to technology, productive assets, soil quality, and level of development, but the characteristics of smallholders and their living conditions face several resemblances and common difficulties (Rapsomanikis 2015).

One of the main challenges relies on the socio-economic situation of smallholders, with high levels of poverty, lack of qualified human capital, and several cultural barriers that damage the productivity of farms. Most farmers depend on agriculture as the main or only financial source, while getting very low income from this activity. In Mozambique, for example, farmers earn an average of \$1-2 per day (CGAP 2016). Living below the poverty line and in rural and remote areas, affording expensive tools, technologies or higher education is almost unbearable for this population. The labor shortage has become a challenge with many people migrating from rural areas to cities looking for better opportunities and quality of life, which leads to an increase in terrace abandonment and the reinforcement of family members as the only workers in smallholders' farms. Moreover, cultural barriers and illiteracy are also frequent problems within this population in developing countries. Women and girls are traditionally in charge of domestic chores and fieldwork and excluded from education and employment opportunities, which aggravate low wages, economic dependence, and vulnerability to domestic violence. When it comes to business, agricultural practices and marketing strategies could increase the income of the smallholders but there are several barriers linked to communication problems and

asymmetric information. Moreover, by having limited access to modern knowledge on agronomy, most farmers rely on old knowledge passed through the family members that may not be up to date (Chapagain and Raizada 2017).

On the other hand, in developing countries, technological and operational conditions are a primordial problem, manipulating yields, soils degradation, quality of the products, etc. Access to agricultural inputs and machinery is scarce and jeopardizes the competitiveness of the farmers in the global market, especially when there are other challenges regarding environmental practices (Chapagain and Raizada 2017). Most of these economies must import machinery that is not internally fabricated to include in their production processes in order to reduce the workforce. These purchases bring additional costs in terms of taxes, transportation, and maintenance needs. Furthermore, environmental conditions play a decisive role in agriculture with unpredictable outcomes and threatening problems such as soil loss and water erosion due to intensive farming. Unstable weather conditions, extreme events, and climate change can also increase the volatility of agricultural outcomes (Regmi and Weber 2000).

The root of the supply chain upstream is the farmer whose problems are spread in an interrelated chain. After the farmers, raw products go through the process of transportation, purchase season, processing, and internal/external commercialization, always affected by government policy. Despite the expressed intention to help farmers and the agriculture sector, these policies are commonly questionable, bringing negative consequences to the supply chain agents. The challenges and living conditions of farmers are many times the same experienced by the general population in developing countries, bringing similar consequences and barriers to the up and downstream partners of the farmers in the agricultural supply chain. In the cashew business in Mozambique, intermediaries collect the production of smallholders and sell it to processors through an exhaustive and chaotic purchase season, which benefits neither farmers nor processors. Moreover, government legislation in these countries is not always constant and

reliable, which leads to additional instability, uncertainty, and lack of transparency in the agricultural sector (Costa 2019).

To solve some of these issues, governments and development-oriented organizations have approached these challenges from different angles, intending to improve the farmers' situation. A research paper from the World Bank and several Universities from developing countries (Steven Jaffee 2011) has analyzed how these institutions improve farmers' market access and divided it into 3 approaches. A bottom-up strategy might be used, which focuses on smallholder farmers and their ability to produce, to act as a group to gain strength in the market, and to comply with standards and demands that may come from more developed markets. Others might employ a top-down approach, where the focus will be on the ability of firms to interact and integrate the farmers into their business model. Lastly, an intermediate approach can also be used, where the entities will enter the supply chain and perform as supporting agents in roles they see as critical for the functioning of the whole chain.

During an internship for Pakka Foundation, we were involved in a project called AMCANE, a union of three organizations whose goal was to incentivize the production of organic and fair-trade certified cashews and peanuts in the northern region of Mozambique. The intervention was mixed, as part of the approach was bottom-down, but the organizations also supported the supply chain in key roles. Smallholder farmers were given support in the form of education for organic agricultural practices and overseeing their implementation. Furthermore, they were incentivized to form cooperatives to gain market power and supported during the legal processes. Additionally, the project took charge of the organic certification processes, which should warrant the farmers a higher price for their products. As for other points in the supply chain, AMCANE was developing an organic fertilizer that could be home-made with easily accessible resources, which should increase the farmers' crop yields. The consortium also tried to enhance the linkage between the farmers and industrial processing units (which the products

always must go through to become edible), guaranteeing processors would be interested in making organic and fair-trade products. Finally, one of AMCANE's organizations acted as a purchaser of the final product, assuring premium-price demand for all the output that the project would produce – provided that there was enough volume for the operation to be financially viable.

During this paper, we will analyze the cashew industry in Mozambique, making use of the insights collected during the internship – gathered through research and interviews with multiple stakeholders. Using this information as a basis, we will then explore existing academic research regarding two different topics – policy making in agriculture and agricultural cooperatives' impact in developing countries. The factors were considered critical for the success of AMCANE and a deeper understanding of these could clarify if the project was set up in the best way possible. In the end, this information will be used to provide recommendations on both of these topics and suggest future lines of research.

Literature Review

In the sustainable business field, a study has been developed on environmentally and socially sustainable operations (Christopher S. Tang 2012), where increasing pressure from governments and consumers is identified as key drivers for more sustainable businesses. To achieve this, businesses must take a holistic approach, balancing financial (profits), resource (planet) and development (people) flows. Finally, the authors categorize recent research developments and identify the main gaps in knowledge, where research still needs to be further developed. Another study investigated the application of planning models in the agri-food supply chain (Ahumada and Villalobos 2009), which were expected to benefit farmers by increasing efficiency and savings. The authors concluded that current planning models were ineffective when addressing perishable products, as they failed to incorporate key

characteristics. However, the current consumer demand trends for higher quality, healthier products will represent a need to improve current supply chain planning practices.

With smallholder farmers' welfare in mind, several studies have analyzed different agricultural policies, their impact, and how the government must adjust its action depending on the context and the sub-goals of the policy. One report provides insight on two United States of America's subsidy programs – Price Loss Coverage and Agriculture Risk Coverage and their effects on the farmers, consumers, and the government (Alizamir, Iravani and Mamani 2017). An investigation has also been conducted on the effect of subsidies by looking at the Danish government's direct incentives to organic farmers (Akkaya, Bimpikis and Lee 2019). The authors compared their effects with those of a tax imposition in chemicals, and with a mixed policy, where the revenues from the taxes were used to pay for the subsidies. Furthermore, a study on reform efficiency in developing countries compared a direct transfer of money to smallholder farmers a Guaranteed Support Price (GSP) (Guda 2021). The latter is a minimum value at which the government will always buy the farmers' output, finding significant differences when yield uncertainty is high and when food security is of high importance. Finally, a study provided insights into the Unified Market Platform, an Indian policy that aggregated agricultural sales on a single platform and analyzed its impact on farmers (Levi, et al. 2020). Regarding this study field, this paper aims to contribute to it by analyzing relevant studies in the area and their main conclusions. Furthermore, it will combine this knowledge with the insights obtained during an internship within the Cashew Industry in Mozambique. Lastly, policy recommendations will be made, aiming to increase smallholder cashew farmers' welfare in Mozambique.

Recognizing the importance of agriculture and the emergence of a new type of organizational form, several authors conducted studies about agricultural cooperatives. From challenges to benefits, and from measuring their performance to analyzing their evolution, research on this

topic is extensive. Vladislav Valentinov explains the importance of cooperatives in agriculture, highlighting that the transaction cost-economizing effect present in family cooperatives comes with several obstacles that jeopardize the business potential of the cooperative. In fact, these family-owned cooperatives are limited in terms of economies of scale and growth opportunities. His work enhances the importance of this type of organization, reinforcing the need to overcome the family cooperatives characteristics and develop a new type of cooperatives to improve the farmer's business and welfare (Valentinov 2007). Jaehyung An, Soo-Haeng Cho, Christopher S. Tang released a study about the aggregation of smallholder farmers in emerging economies. In this paper, the authors explore five different operational effects that cooperatives might have in the alleviation of poverty in developing countries. In fact, their calculations conclude that agricultural cooperatives have a positive impact on the farmers' life but also on the market as a whole. Lowering the costs, stabilizing the process yield, developing a stronger brand, shortener the supply chain, and creating an exclusive direct sales channel and a guaranteed selling price were the benefits pointed out in their conclusion (An, Cho and Tang 2015). When analyzing the Mozambican cashew industry, it was clear that the cooperatives business model has the potential to positively impact the cashew supply chain. The above-mentioned studies became significantly relevant to recognize the importance of agricultural cooperatives as a solution to improve welfare in farmers in developing countries. Nevertheless, this paper combines the theoretical information given and precious insights collected through on-field interviews with several stakeholders of this supply chain in Mozambique. Complementing these studies can lead to a possible solution to develop successful cooperatives models for cashew farmers in Mozambique.

AMCANE

From June to October, we were given the opportunity to have an internship in a project called AMCANE – Sustainable Cashew & Peanut Small Business. It was started in 2018 and originates from a public-private partnership between three organizations – Helvetas, Pakka, and Aga Khan Foundations. Its goals were to improve farmers’ income by helping them achieve higher productivity and reduce postharvest loss while having them organized in cooperatives to aggregate their agricultural output and increase their negotiating power. Furthermore, farmers would produce certified organic and fair-trade products, which should warrant higher prices.

We worked specifically for Pakka Foundation – a Swiss company that specializes in trading organic and fair-trade peanuts and cashew. Their function within the project was to act as a purchaser for the finalized products, guaranteeing that there was a demand for the specialized (organic and fair-trade) products that would be produced. Under the guidance of Martin Lichtenegger, we were asked to compare how the project was developing against the goals that had been initially defined, and to issue an informed opinion on whether it would be viable for Pakka to pursue this business opportunity or not. Despite the project handling both cashew and peanut farming, the focus of this paper is solely on evaluating the cashew side as Pakka had practically excluded the possibility of purchasing the latter.

To be able to execute this work, the project provided us with multiple contacts within the cashew industry in Mozambique. We were able to conduct interviews with smallholder and large farmers, cashew farms that also possessed a processing system, industrial processing units, cashew exporters, and several other stakeholders who play key supporting roles. Hence, we gained access to a wide variety of insights, some of which resulted from informal conversations and are not accessible from official reports or published information. However,

one of the main shortcomings of this process was the fact that all the interviews had to be conducted online, as we could not travel to Mozambique.

The raw cashew nut (RCN) arises from the plantation of the cashew tree and goes through several processes until it is transformed into a consumable cashew nut. After being planted, a cashew tree takes on average 3 to 5 years until it starts bearing fruit. These cashew trees have a lifespan of 20 to 25 years before the yields per tree start decreasing. During this period, the average yield per tree increases from about 2 kg at 3-5 years to 4 kg at 6-10 years and 5-10 kg when trees are 11-15 years of age. Thereafter, trees yield more than 10 kg as the trees get older until the decline. During this cycle, some practices must be considered for an effective harvest period (Government of India n.d.). For example, farmers need to take care of the cashew trees by pruning them and cleaning the field around them. The soil characteristics for a successful plantation are not very demanding and the productivity of the production can easily adapt to a variety of soil conditions. However, some problems can be pointed out regarding the production since many farms suffer from pests and diseases that infest the cashew trees and compromise their outputs. After the harvest period, the primary processors need to steam, roast, or immerse the RCN in a hot oil bath to transform the input into the edible cashew kernel. Secondary processing is optional to salt, fry, roast, flavor, or even mix the cashew kernel with other nuts (Costa 2019).

To reach the final consumer, the cashew journey involves many agents and different steps that start with the farmer and finish with the final consumer. As stated above, the RCN grows on cashew trees planted by farmers, which is the first step in the supply chain of cashew. When the harvest season arrives, the RCN is collected by farmers and, if necessary, seasonal workers hired by them. The best harvesting practice consists of simply picking the fruits that have dropped to the ground after maturing. In Mozambique, this season is counter-cycled and happens from October to February, with the majority of harvesting and purchasing occurring

in November and December. In competitive countries, like India and Vietnam, harvest season occurs between February and May. The RCN bought in this short purchase season is then used by processors during the entire year of activity with no other purchasing period. Intermediaries are commonly independent workers that build a bridge between the upstream partners (the farmers) and the traders or processors of cashew. Therefore, RCN goes through a process of transportation and negotiation from the intermediaries to reach the next step of the supply chain. In processing facilities, the transformation of the raw material into the kernel can be done mechanically, manually, or fully automated. At the end of the primary processing, the conversion rate of RCN into kernels is about 20% and the product is ready to be consumed. As explained, secondary processing can be pursued before reaching the consumer. The cashew kernel can be sold from the processors to commercial facilities or traders who export the kernel, connecting the product to end-consumers, the last step of the supply chain. For the internship, the only relevant processing was the primary one, exclusively in Mozambique (Appendix A).

To better understand the market potential and the challenges present in the cashew value chain in Mozambique, it is important to conduct a general analysis of the industry's history and evolution and the position of Mozambique in the world. In 2019, the main producers of RCN in the world were Ivory Coast and India, followed by Benin, Vietnam, and finally Nigeria and Mozambique (Appendix B). On the other hand, the main cashew nut processing countries over the last 4 years are Vietnam, India, Brazil, Ivory Coast, Mozambique, Indonesia, and Nigeria (Appendix C). For the top 3 consuming countries, India takes first place, followed by the USA and Germany. In Mozambique, the production of RCN has not been constant with a significant decrease between 1982-2004, irregular growth between 2004-2014, and the expectation of acceleration after 2014. Regarding this last prediction, there are several reasons to believe in an increase in the production of RCN in Mozambique. In the past years, this country faced the end of a ban on exports of RCN and the end of a civil war in 1992. At the same time, the global

demand for cashew increased and so did the competition between exporters and local processors to access RCN. These factors led to an increase in the prices of RCN and consequently, an increase in income for cashew farmers. Additionally, INCAJU started supplying plant seedlings, seeds, and fungal treatments to support producers. Finally, support programs for the sector, in particular, for producers, were financed by international technical cooperation. Hence, RCN production was expected to increase in Mozambique after 2014 (NITIDAE 2020).

When compared to other relevant competitors in the cashew industry worldwide, Mozambique benefits from some advantages. For example, processors of cashew in Mozambique can pay lower prices for RCN in local producers when compared to the prices paid by Vietnamese and Indian processors, due to the factories' proximity to production areas and an average tax of 20% on RCN exports. Moreover, minimum salaries in Mozambique are lower than the ones in other relevant producing and processing economies. This is a very pertinent factor since the cost of unskilled labor is lower in an industry that is human capital intensive. However, this advantage has been losing relevance with the progressive mechanization of cashew processing. Likewise, productivity levels in manual processing can also be considered an advantage. Mozambican workers in cashew factories can shell and peel the products at one of the lowest wages in the world. Although the average cost of labor for manual processing is the lowest in comparison to India, Vietnam, and Ivory Coast, with the growing automation of processing, the impact of low labor costs on the total competitiveness of the industry is decreasing (NITIDAE 2020).

On the other hand, the comparative disadvantages of this country surpass the pros, which put Mozambique in a critical position. First, the taxes paid by Mozambican cashew processing companies are significantly higher than the ones paid in competing markets. Secondly, countries like Vietnam and India give subsidies to processing companies to export cashew kernels, creating an incentive that does not exist in Mozambique. A third problem can be found in the need to import machinery to turn the cashew processing more mechanized. In

Mozambique, the lack of internal supply of this machinery brings additional costs related to the import, transport, taxes, spare parts, need to stock, and even difficulties in accessing maintenance when needed. Furthermore, as the purchase season of RCN is concentrated in 2 to 3 months of the year, buyers require financial support to obtain high liquidity during this period. Nevertheless, in Mozambique, loans pay higher interest than the ones in competing markets, endangering the processors' business. A fifth disadvantage is the high labor costs of qualified and experienced workers. Although unskilled labor is an advantage due to its relatively low price, more specialized labor, which is scarce and costly in Mozambique, is also required. Lower yields can also be a factor of disadvantage in the country of analysis. Less mechanization, know-how, and organizational flow, combined with old and matured trees can lead to lower yields than in competing economies. A seventh difficulty is regarding the barriers to export, and this is a disadvantage when competing with India since this country is the first consumer of cashew in the world. Hence, Indian processors find a massive domestic demand protected against imports from other processing countries. This aspect allows Indian processors to demand higher prices when selling cashew kernels while remaining competitive. Finally, most countries have a market for by-products of cashew nut processing, which processes unused cashew parts to create different products, generating additional revenues. In Mozambique, however, this market does not exist which brings further costs for waste evacuation and a loss of a business opportunity (NITIDAE 2020).

Another relevant factor for the market analysis is to better understand the political situation of the country and how the law can affect the cashew sector. In Mozambique, 20% of the income derived from the tax on RCN exports is supposed to be used to support the national cashew industry yet, processors insist that their needs are being neglected, with most of this income being used to benefit producers. Furthermore, there is also a lack of transparency regarding the use of income generated by taxes in this industry. Moreover, policymaking also influences the

value chain of cashew nuts in terms of labor – since taxes on wage payments are very low, manual processing is preferred over mechanized procedures. Furthermore, the taxes paid by new cashew processing factories in Nampula, a region in the North of Mozambique, are double the ones faced by the same factories based in Ivory Coast, India, and Vietnam, during the first 11 years of business. After the initial investment phase, the taxes remain higher in Mozambique, creating a barrier for any processor that intends to start a business in this country. Since 2019/20, technical councils discussed the reference price, the impact of this price, and the need to maintain the preferential purchase window to protect the industry. These technical councils have representatives from processors, exporters, and producers and aim for better conditions and an increase of the activity in the cashew sector. Lastly, it is important to mention that the legislation in Mozambique in what concerns the cashew industry is very irregular and unpredictable, with laws still incapable of securing workers with fair payments and good labor conditions. It is worth mentioning that new legislation was being prepared by the time of our internship (NITIDAE 2020).

Namely, there has been a debate between the main agents of this supply chain that is responsible for delaying the new legislation, since both parts have different interests. In 2019, the Cashew Law received a new policy proposal to gradually eliminate the tax on the export of RCN. This would be complemented with the opening of exports during purchasing period of processors and the establishment of a reference price policy. However, this proposal was not implemented, due to pressure from Mozambican processors, as they were afraid of losing their advantage, since the tax is one of their main competitive advantages. This originated a tension between stakeholders – on one side, producers support the elimination of barriers to export RCN since low taxes make it easier to sell RCN to external processors, possibly at prices that are not practiced in the internal market. On the other hand, processors demand barriers to export RCN, since, without these taxes, it becomes more difficult for them to buy RCN in Mozambique due

to their competitors in India and Vietnam superior purchasing power, emptying the raw material available in the country, or raising the market price (NITIDAE 2020).

Finally, for the market analysis, the social situation and culture of the Mozambican farmers have to be taken into account to evaluate the potential of the business. The social environment of the country plays a huge role in the success of a business. In this case, since Pakka is from Switzerland, it becomes even more important to understand the main differences in culture to develop a good business strategy. For instance, through interviews conducted with locals, it was possible to recognize that producers are willing to give major discounts to buyers that offer immediate cash, ignoring previous agreements. Besides, it is not possible to rely on pre-harvest contracts regarding production and prices as producers and intermediaries do not respect them. This becomes a challenge for anyone aiming to do business in Mozambique since contracts are considered useless, which increases risk. Another relevant comment from the agents interviewed was regarding the common practice of stealing cashew production. These thefts may occur during the harvest season, or even during transportation through intermediaries, creating significant losses for the supply chain. Finally, the market information is not always reliable with constraints regarding traceability and information about numerical data.

At the start of the cashew value chain in Mozambique, farmers can be divided into three categories – small, medium, and large. Approximately 80% of the farmers in the project are small farmers, who are also the most prevalent in the country. These will usually have 10 to 20 cashew trees, scattered throughout their land in a non-organized way. Furthermore, these trees are usually old and unproductive, and the farmers will invest no time or money in increasing their productivity. All the work related to cashew tree handling, field clearing, harvesting, and separation is done by them and their family members. At this stage, these small farmers do not perceive cashew as a reliable source of income, but as a bonus that they happen to have. Intermediate farmers can be distinguished from small farmers by the number of trees and the

approach they take towards their cashew plantations. These will usually have over 100 trees and will look at cashew as a serious, income-generating activity. They are more likely to invest in inputs and must hire locals to help them during the various steps of the plantation and harvesting seasons. Finally, large farmers in Mozambique are people with over 500 cashew trees. They rely on inputs, advanced farming techniques, and even machinery to achieve higher yields. Furthermore, they might hire fixed workers who will support them in their farming ventures during the whole year, while still having to hire extra hands for the harvest season.

The average yield in Mozambique is very low when compared with the rest of the world, oscillating between 2 and 4 kg of RCN per tree, which can be attributed to four main reasons (Große-Rüschkamp and Seelige 2010): (1) Farmers' poor agricultural practices: Most farmers have little knowledge on how to handle trees to better increase their productivity, and even use harmful practices such as illegal fires to clear their fields; (2) High disease prevalence: oidium and anthracnose are two cashew tree diseases which are particularly frequent in Mozambique; (3) Farmer's mentality: Most farmers do not perceive RCN as a reliable source of income, thus they do not invest in it; (4) Trees' old age: The average cashew tree is very old in Mozambique, and little investment is done in renovating these trees. However, AMCANE farmers showed a higher average yield, with an average of 4.7 kg per tree, with one of the two regions reaching 6.1 kg of RCN per tree (Appendix D). The fact that the program provides education on good agricultural practices and tries to change the mindset of farmers may be one of the reasons behind this improvement. During the interviews, the farmers indeed showed extensive knowledge on what the best agricultural practices were and a high commitment to making a reliable income source for them. Furthermore, their organic pulverization product, which will be discussed ahead, may also be improving yields in the project.

To combat low yields, the government launched a program where they subsidize chemicals to cashew farmers, but it became extremely controversial amongst different stakeholders. During

multiple interviews, it was widely reported that the program was ineffective and a source of corruption. One of its major problems is that, despite the government offering the chemicals, farmers still must hire a service that will spray their trees with a specialized technician and pulverization machine. These service providers will require payment in RCN of 2 to 3 kg per tree sprayed. Since this value is close to the amount of RCN that the trees produce, many farmers will not trust that they will have a high enough increase in yields to compensate for the loss of what might be all their production pre-pulverization. As to the efficacy of the program, official reports (MZNews 2021) state that the program has pulverized 8 out of 20 million trees in 2020. However, different interviewees, amongst which were people who had worked in partnerships with the government, stated that these numbers were inflated and hid the inefficiency and corruption behind this initiative. Ultimately, the government has already announced that they will start phasing the program out and rely on businesses to fulfill the demand there might be for these inputs.

AMCANE identifies yield increases as a critical factor for the project's success. However, since organic certification does not allow chemical use, they are developing the Biospray – an organic solution that would allow farmers to combat the prevalent tree diseases in the country. However, they would still have to rely on a service provider to operate the pulverization machine. This means that one of the problems of the chemical pulverization would persist – aggravated by the fact that the pulverization machine would have to be solely used for organic pulverization, to comply with the certification requirements. Additionally, AMCANE's most recent studies on Biospray could not demonstrate its efficacy. This research consisted of spraying trees with a mixture of water and Biospray, using four different concentration rates, and comparing their outputs. The results were disappointing, as the cashew trees yielded between 2.7 kg and 4.8 kg per tree, a value that is extremely close to the current average tree yield in Mozambique

(Appendix E). Even in the best-case scenario, the increase in productivity would not be enough to compensate for the pulverization costs.

After the production of RCN, intermediaries are an important step in the supply chain of cashew in Mozambique. Since each farmer produces a small quantity of cashew, intermediaries play the role of collecting the product from multiple farms. These agents buy from the producers and aggregate enough RCN to sell to processors or traders, adding an extra step to the supply chain. Usually, intermediaries have no previous arrangements with processors and try to obtain the best deal going door to door after gathering production. However, some processors have established contracts with intermediaries they can rely on. Due to the presence of these actors, farmers do not know the destination of their products nor the price that will be charged to processors and traders.

Processors are the next phase on this chain, a critical group that carries a high level of risk in Mozambique. Interviewees from this group were reluctant to share internal data for the project, so they could maintain competitive advantages. Condor, one of the biggest cashew processors in Mozambique, was interviewed and reported that it had shut down the 2 processing units in the northern part of the country, with a combined processing capacity of 1,400 tonnes. Some other processors like Caju Ilha, ADPP, and ETG also admitted some difficulties in the past years to conduct their business activity in this country. The costs and margins for processors vary depending on production capacity and processing techniques. Most of these agents were not comfortable sharing detailed information regarding their margins, however, some previous studies on this field were able to indicate valid estimates for these values. According to Nitidia 2020, for an automated factory with 5,000 tonnes of capacity, the average cost of processing 5 kg of RCN is \$5.81 that is then sold by \$7.70, leading to margins of about 25%. The main costs of these agents are the inputs (RCN) with 68% of the total costs of processing and fixed costs are the second, representing 20% of total costs (Appendix F).

The negative results and deficient productivity of processors are the results of huge challenges, culminating in several shutdowns and financial problems. The first problem mentioned is price instability which adds risk to the processors' business. The international price of cashew nuts is very volatile, and this brings instability to the processing activity. For example, from 2017-2020, the Price of Cashew Nuts dropped from 70 MZN/kg to 37 MZN/kg. The lack of Machinery and Specialized Work is another challenge for processors. Most of the processing of RCN into cashew nuts is done manually with seasonal workers since machinery and specialized resources need to be imported. Thirdly, even if there is an initial agreement with intermediaries, processors cannot rely on those since loyalty is difficult to guarantee. Frequently, this results in losses of money or inputs that are needed to process. Moreover, processors from India and Vietnam buy RCN in Mozambique, offering producers/intermediaries higher values than the ones being practiced in the internal market. Mozambican processors face difficulties to buy RCN or match those offers, resulting in insufficient inputs to process and continue their business activity. The purchase season is one of the most relevant aspects when analyzing the processors' threats. In fact, during this season, the amount of RCN purchased is the one used to process during the year, with no other purchasing season. Therefore, processors concentrate a huge percentage of their costs in a short period, and when the price of cashew drops, the initial investment in RCN might lead to financial problems. Consequently, these agents sometimes are required to take a loan. When facing financial problems, processors mention the difficulties in accessing credit to recover and restart their activity, being forced to shut down factories and interrupt their source of income. Furthermore, processors in Mozambique transact MZN, when their final business partners are regularly international and buy the products in USD or other currencies. From the purchase season until the moment of sale, there can be fluctuations in the value of both currencies. When MZN depreciates, processors lose money. The social culture of the country with the urge for money

and immediate cash from the producers' side can also endanger the quality of the final product completed by processors. Some farmers rip out the RCN before its time, compromising the final cashew nuts quality. Although current legislation states that internal demand should be fulfilled before exporting RCN to other processing countries, some processors are also traders and buy RCN to export instead of processing. Thus, disloyal Competition becomes another challenge faced by processors. Lastly, illegal practices are difficult to avoid and can also compromise the success of national processors. Some illegal buyers of RCN enter the country through the borders before the beginning of the purchase season with bags of cash to offer to producers in exchange for illegal deals. When purchase season arrives, countless quantities of RCN are already out of the market and Mozambican processors cannot access them.

Purchase season is a critical moment for all participants of the cashew value chain. However, multiple interviews with different stakeholders highlighted it as a highly competitive, hostile, and unpredictable period. An employee from a reference bank in Mozambique, who specializes in financing the cashew industry, reported – “people come from all neighboring countries with cases of money. They will try to buy RCN illegally at all costs, stolen or not”. This promotes theft within communities, disincentivizing people and businesses to invest in the cashew value chain. To make matters worse, the owner of an industrial cashew-processing factory also confided that customs agencies regularly comply with illegal exports, making it difficult for local processors to acquire RCN at competitive prices. Regarding smallholder farmers, an administrator of a Mozambican agricultural company stated that a contract or an agreement has very little value in Mozambique, which has forced them to adapt their business model. According to them, a farmer may very easily abandon an already established and more profitable deal in the future if a buyer appears with the capacity to pay in cash. For this reason, processors incur extra costs to have high liquidity during this season. In conclusion, to quote

the owner of a large cashew farm in Mozambique – “The cashew purchase season is like The Wild Wild West, everything goes”.

At the end of our analysis, we concluded that both Mozambique and its cashew industry face structural problems that cannot be solved by Pakka and have a massive impact on the project results, making it an uncertain and risky venture. For instance, by having an average yield of 3 kg per tree, farmers face the necessity of increasing cashew yields. Through government incentives, they are offered the chance to use chemicals and fertilizers to increase productivity, compromising the competitiveness of organic production, which is the only product Pakka Foundation is willing to purchase. Furthermore, legislation in the cashew market in Mozambique is subject to constant changes, making it difficult to predict the next steps in the sector. Finally, the hostile business environment is a relevant factor that cannot be forgotten. The prevalence of corruption and unethical practices along the cashew value chain dramatically increases its risks.

As we were developing a consulting project for Pakka, a final presentation with all these findings and results was presented to the foundation. With very positive feedback, our suggestion was to not go forward with the project based on all the information gathered during the 3 months of the internship and summarized above. Pakka considered our study to develop the following years' plan, agreeing with our advice and congratulating us for the valuable insights collected.

Agricultural Policy Making: The Case of Mozambique

Public policymaking can be broadly characterized as the actions taken by a government to solve a specific problem, implemented through a previously defined strategy (Anderson, 1975). It is a deeply complex and highly contextual process, with an uncountable number of factors influencing the decision-making and its outcomes (Osman). Due to this, a policy that may have been highly effective in a developed country cannot be mimicked into a developing country to achieve the same results. In the latter type of countries, policy-making is highly influenced by the frequent socio-economical instability factors that permeate them. In this section, existing studies on agricultural policies from both developed and developing countries will be analyzed, followed by a summary of the main challenges they try to solve and the tools used. Upon this, a comparison will be made with Mozambique's current policies in the cashew industry. Finally, recommendations of new and adapted policies in Mozambique will be given.

Existing Research on Agricultural Policies

In the next paragraphs, relevant studies in the agricultural policy field will be analyzed, focusing on the tools used by different governments, the challenges they were trying to overcome, and their efficiency. The measures to be studied are the following: 1) An United States' policy where farmers were able to choose between two different subsidies, triggered by either a fall in price or revenue; 2) A Danish intervention where farmers were supported through subsidies for innovation in production, followed by a comparison with tax-based and mixed approaches; 3) A policy where the government acts as a buyer, establishing a minimum price, compared with a direct transfer of money to farmers; 4) An Indian market platform which centralizes product offerings and increases transparency in the value chain.

The first study (Alizamir, 2017) analyzed a United States government policy, which gave farmers the option to choose between two subsidy programs – Price Loss Coverage (PLC) and

Agriculture Risk Coverage (ARC). The first, PLC, is a program that pays farmers a subsidy when the price of their crops falls below a certain reference price. The second, ARC, provides farmers a subsidy when the revenue of their crops falls below a certain threshold. The policy required the beneficiaries to make a one-time choice between the two programs. The results biased heavily towards the second program, with 77% of farmers opting for it. Comparing the two options, PLC has the advantage of protecting farmers from selling their products at a loss if the prices of their products fall too low, but so does ARC. However, if yields are particularly bad in a year, the decreased supply will make prices increase, while farmers will have fewer products to sell. In this case, ARC will protect farmers, while PLC would be ineffective. Looking at this example, intuition might indicate that ARC is a superior program, as it covers risk from two angles. However, this might not always be the case – for example, PLC has the advantage of incentivizing production, which can lead to higher expected profits for farmers while still delivering low prices to consumers, due to an increase in supply.

Inspired by Danish government policies, the second study (Akkaya, 2019) investigates how agricultural innovation can be promoted using direct subsidies, tax imposition, or zero-expenditure policies, which are a combination of both with fiscal revenues being used to finance the subsidies. The authors recognize that innovation in agriculture can represent a big risk for producers, making it prohibitive for those without a capacity to sustain financial losses. Not only does innovating represent a high cost, but it also frequently leads to decreased yields in the first years of implementation. For these reasons, the Danish government applied different policies when they wanted farmers to adopt organic production. One of these was the payment of a direct subsidy to farmers who adopted these new agricultural methods. Furthermore, they also subsidized the organic certification process. On the other hand, Denmark increased taxes on chemical fertilizers to disincentivize their use. The study concludes that a subsidy-only policy will always surpass a tax-based or a mixed approach in terms of social welfare.

Nonetheless, the latter two will surpass the subsidy approach in terms of experimentation rate and, in some cases, consumer surplus. Importantly, if producers are financially constrained, this is, they cannot afford a yield loss by implementing a new production method, then a zero-expenditure policy may also be effective in increasing social welfare.

The third study (Guda, 2021) analyses the efficiency of agricultural support prices in developing economies, comparing them to a direct transfer of money made by the government to farmers. The first, Guaranteed Support Price (GSP), happens when the government assures a minimum value at which they will always purchase the product to farmers, independently of the market price. This policy has three important benefits: 1) Supply-side incentive: farmers are encouraged to produce and are protected from price reductions; 2) Demand-side provisioning tool: as farming output is increased, a large proportion is purchased by the government, which can use it to support the economically needed population. 3) Food security: as a complement to the previous point, this policy also allows the government to maintain a reserve of food. The second policy, Direct Benefit Transfer (DBT), consists of direct transfers of monetary subsidies to individual beneficiaries. It has the advantage of increasing transparency, decreasing the number of intermediaries, and simplifying the process for the government. Furthermore, it allows farmers to define their priorities and invest the money accordingly. As the previously analyzed studies, the efficiency of the policies will depend on their ultimate goals and the characteristics of the beneficiaries. The advantages of both schemes are identical and superior to no intervention unless food security is of high importance to the government, in which case the GSP scheme will bring more benefits. Additionally, the paper identifies the poorness of below-poverty-line (BPL) consumers and yield uncertainty as impediments to production by farmers. While under extreme poverty both policies have similar effects, if yield uncertainty is dominant then the GSP scheme will dominate DBT in terms of increasing agricultural output.

Finally, regarding access to market information, a study (Levi, 2020) was conducted on the effects of increasing the availability of information and its impact on smallholder farmers' well-being. It analyses the Unified Market Platform (UMP) – an Indian policy implemented in 2014 which aimed to unify all trades in the agricultural wholesale markets through a common platform. The paper identifies three main reasons for farmers' weak market position in India: 1) Their inability to transport and store products restricts them to local intermediaries, who are called *mandis*; 2) Traders, who purchase a product from *mandis*, need to have a license for each of these intermediaries, further strengthening *mandis*' position in the market; 3) The price-setting process is done in a handwritten, undocumented way – incentivizing collusion between parties. The UMP, coupled with other measures, tackled the issues presented above by changing the processes through which transactions were made. Firstly, it implemented an online, first-price, sealed-bid auction for traders to purchase from intermediaries. Secondly, all agricultural product that arrived at *mandis* was recorded on the platform and visible to all traders. Furthermore, traders were now able to purchase from all *mandis* with a single license, democratizing the purchase process even further. Finally, efforts were made to increase the transparency of prices to farmers – computer kiosks were installed for farmers to have access to this information and short message service (SMS) messages were sent to farmers with the same purpose. The conclusion is that the online platform resulted in a price increase between 3.5% and 5.1% in three different agricultural commodities (paddy, groundnut, and maize), but was unable to have the same effect on others (cotton, green gram, and tur). Additionally, it also resulted in an increase in profit for farmers who produce higher quality commodities, which could indicate that a more transparent market is an incentive for farmers to improve the quality of their production.

Choosing Policies to Solve Farmers' Challenges

After analyzing some of the most recent agricultural policy research, it is now important to summarize which of them are totally or partially directed at benefitting farmers, and which general challenges each of them try to solve. With this base and the insights gathered through the internship, it will be possible to make policy recommendations for Mozambique. During this section, the general farmers' challenges identified have been: 1) Price Uncertainty; 2) Yield Uncertainty; 3) Unwillingness to Innovate – with different policies being applied depending on the financial restrictions of the farmers; 4) Intermediary Dependency.

The first set of challenges to be considered are agricultural price and yield uncertainty, which farmers can be protected from through subsidies triggered by price drops or farmers' revenue drop respectively. Furthermore, a guaranteed support price policy can also cover both instances. Another challenge might be the farmers' unwillingness to innovate, which can be addressed by subsidizing the innovation, taxing the alternatives, or a combination of both. If the goal is to increase social welfare, governments should apply a subsidy policy, but if it is increasing the experimentation rate, the other alternatives are more appropriate. However, if farmers are financially constrained, then a mixed approach may also increase social welfare. Finally, if the challenge is intermediary dependency coupled with frequent corruption or collusion practices, country-specific measures that increase the farmers' access to information and the overall transparency of the value chain can have a positive impact on the prices received by producers.

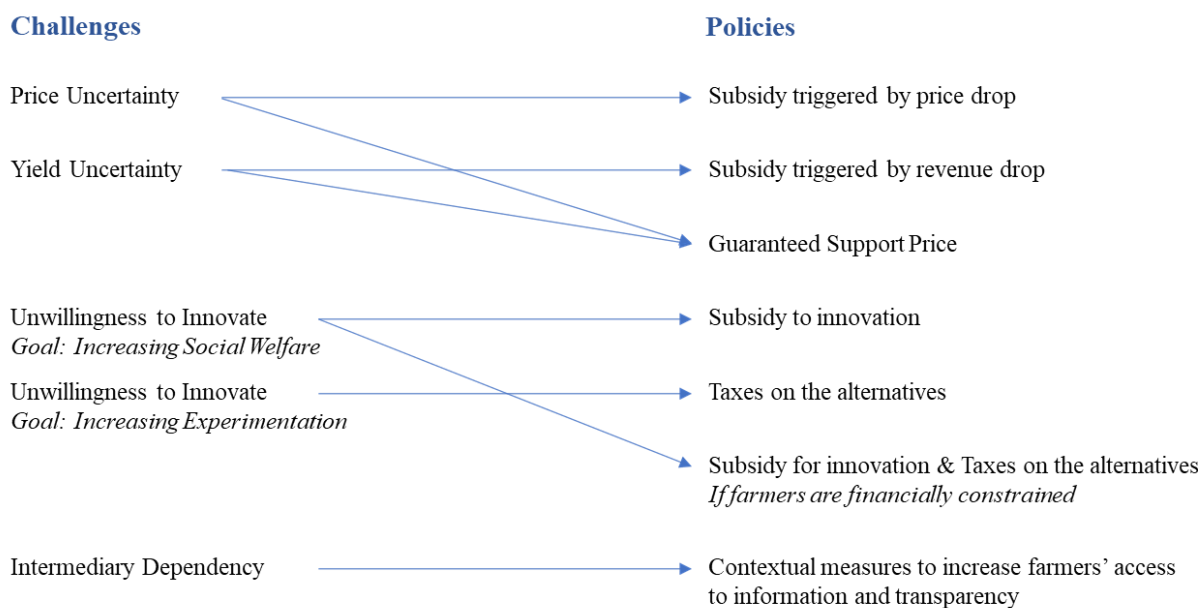


Figure 1 – Connecting general challenges with policies.

Policies in Mozambique

Currently, in Mozambique, four agricultural policies impact cashew farmers – pulverization chemicals distribution, reference price, tax impositions on RCN exports, and a maximum RCN export quantity imposition. Each of them will be explored, with access to the information acquired through previous reports and studies, and interviews conducted during the internship.

Firstly, the chemical pulverization distribution, which has been mentioned previously, is a program where the government tries to solve the issue of low yields by fighting the prevalent tree diseases, oidium, and anthracnose, with an annual expenditure of €5.5 million. The government relies on the purchase and distribution of chemicals as the sole incentive for farmers to pulverize their trees. However, during our interviews, we had multiple stakeholders condemn the program and explain it was widely inefficient.

One of the main problems identified was the fact that, despite receiving the chemicals without costs, the farmers still had to hire someone with a pulverization machine to apply them to their trees. The payment demanded by these service providers is made in RCN, and they usually

charge 2 to 3 kg per tree, which is most farmers' current yield pre-pulverization. For this reason, farmers are not willing to hire the service, as they do not trust that their output will increase enough to compensate for the price they are paying which, from their point of view, is their whole production. Additionally, corruption was reported as a frequent problem with this type of program and stated that many of the chemicals are diverted and sold to other countries for profit. When confronted with reports that stated that 8 out of 20 million trees were pulverized per year, an expert interviewee who led a consultancy project in the Mozambican cashew value chain said it was "simply impossible". Lastly, by supporting only a fraction of the farmers, the program fosters inequality and disincentivizes the remaining ones to invest in pulverization, as many will be unwilling to buy chemicals when there is the possibility of getting them for free. To further aggravate this issue, the criterion for distribution is not explained, reducing transparency, and creating information asymmetry.

This policy is comparable to some of the subsidy policies previously analyzed, and the issue it is trying to solve is an unwillingness to innovate, with farmers being financially constrained. At first sight, it looks like it should have an extremely positive impact on the producers' yields – most farmers currently have few resources to fight cashew tree diseases, and pulverization should be one of the best ways to do so, allowing for significant increases in yields. However, the problems lie with its execution – many chemicals do not reach the farmers, not all farmers who receive them are willing to use them and the ones who are not supported are disincentivized to purchase them. Ultimately, the government has announced they will start phasing out the program, shifting the responsibility to the private sector.

The second policy to highlight is the reference price, a policy in Article 23 of Mozambique's Republic's Bulletin 238, from the 6th of December of 2018. It states that every year, before the purchase season, the government must gather several stakeholders from the cashew value chain and have them negotiate the Parity Price (PP) and the Reference Price (RP). Then, RCN

purchasers must pay producers a value between these two prices, which are set through the following formulas:

1. $Parity\ Price = \frac{Cost\ of\ Raw\ Materials\ for\ Processors}{Processed\ Amount}$
2. $Cost\ of\ Raw\ Materials\ for\ Processors = Processors' Revenues - Processing\ Costs - Processors' Profits$
3. $Producer\ Price = Production\ Cost + Producer\ Margin\ (estimated\ at\ 15\%)$
4. $Reference\ Price = \frac{Parity\ Price + Producer\ Price}{2}$

As we can see from numbers 1 and 2, the maximum price (PP) is the estimated cost of raw materials per unit of RCN processed, which is obtained by the negotiated estimates of what should be the processors' revenues, costs, and profits. As formulas numbers 3 and 4 demonstrate, to reach the minimum price (RP) stakeholders first calculate the Producer Price, which is an estimate of the producers' costs with a 15% mark-up. Then, the Reference Price is obtained by calculating the average between Parity Price and Producer Price.

The policy is similar to the Guaranteed Support Price previously analyzed, which can be an efficient measure to solve price uncertainty. The major difference between them is that, under the GSP, the government guarantees the purchase itself, while under the reference price, it merely imposes the price on others without participating in the market. According to the conducted interviews with 7 different farmers, the average price received by them during the 2020 season was 47 meticals per kg of RCN, with values ranging between 42 and 57 meticals. Given that the reference price for the season was 37 meticals per kg of RCN, there is no reason to conclude that the policy is not effective in protecting the farmers' prices.

The third policy which is important to analyze is the export taxes on RCN established by the government, which are set in Article 2 of the Republic's Bulletin number 43, from 1999. It states that those who wish to export raw cashew nuts from Mozambique must pay a tax between 18% and 22% of the products' value upon shipping. This measure's goal is to protect the

internal cashew processing industry, which frequently demands protection from their powerful competitors from India and Vietnam. Although none of the previously analyzed measures can be compared to these taxes, a basic macro-economic rationale may be employed to conclude that it does not work in favor of smallholder farmers. By artificially raising prices, the Mozambican government is decreasing demand for the farmers' products, which should make the market price lower than what it would be in a no-export tax reality.

In a similar vein to the previous policy, the fourth policy is also aimed at protecting Mozambique's internal processors, as defined in Article 24 of the Republic's Bulletin, number 238, from 2018. It states that the allowed amount of RCN exported must be the excess of total national production relative to the existing processing capacity. In practice, Mozambique's internal processors determine before each purchase what their processing capacity for the following year will be. Then, the permitted exported amount is calculated as the difference between Mozambique's total production and this value reported by internal processors. Again, one can extrapolate that by strengthening the internal processor's power in the market through artificial demand reduction, smallholder farmers' power in the market is reduced.

Lastly, it is important to mention that the export restricting measures also work as an incentive for the frequent illegal practices in Mozambique, which were the main topic in almost all conducted interviews. For instance, illegal purchasers frequently enter Mozambique before the purchase season begins with the intention of smuggling RCN through the Tanzanian border. This leads to an increase in thefts, as illegal buyers are willing to purchase this type of product. To make matters worse, thefts are usually made by ripping the fruit directly from the trees, which is a harmful practice and reduces the future productivity of trees.

Policy Recommendations for Mozambique

To conclude the thesis, some recommendations will be made to adjust the governmental policy landscape in Mozambique's cashew industry, to benefit smallholder farmers. The existing

agricultural policies in the world, the generalizations made through them, the context of Mozambique's cashew supply chain gained during the internship, and the existing governmental measures in the country will all be key to providing the best possible set of policy recommendations.

As explained before, one of the hardest challenges for Mozambican cashew farmers is, unquestionably, the low yield that their trees produce – approximately 2 to 4 kg of RCN per tree, much lower than what a healthy, appropriately-aged tree should produce. The main factors behind this inefficiency are the farmers' lack of knowledge and willingness to employ appropriate agricultural practices, the prevalence of region-specific diseases, and the trees' old age, as renewing cashew trees is not seen as a priority and, in some communities, cultural factors may make it prohibitive. Comparing these factors with the analyzed agricultural policies in different countries, the focus should be put on the governmental actions that solved the challenge of “Unwillingness to Innovate”, keeping in mind that producers are financially constrained. The Mozambican government should implement policies that incentivize farmers to innovate – by renewing their cashew trees and pulverizing them.

The case of tree renewal is the one where the farmers' financial restrictions are most relevant, as it requires an initial investment for the plantation of trees, which will only bear their first fruits after 3 to 5 years. It is very difficult for a poor smallholder farmer to invest in new plantations, as they would not be able to sustain the financial losses nor have the time to wait for the first revenues from their trees. Given this, the Mozambican government should implement a program where they subsidize the acquisition of the fields and the associated plantation costs. Like other policies in Mozambique, the implementation of this program could be its biggest challenge, and measures should be taken to avoid corruption.

Regarding the use of pulverization, the existing policy of subsidizing the chemicals to farmers seems to be a step in the right direction, although it does not provide the desired results due to

corruption and the unwillingness of farmers to hire the service providers. To improve upon this method, the Mozambican government could start by increasing transparency by showing the selection criteria of farmer subsidization and communicating ahead of time who will or will not receive the chemicals, so farmers are not disincentivized to purchase. Furthermore, the sources of corruption should be identified and the implementation of the project could be given to an impartial, trustworthy NGO, which would ensure the righteous allocation of resources.

Another frequent challenge in Mozambique is the heavy reliance on intermediaries for RCN to go from farmers to processors. The industrial stakeholders need dozens, or sometimes hundreds, of tonnes of RCN for their business to be profitable, but production is highly scattered, and it is impractical for the companies to reach hundreds of rural communities, with many of them being poorly served by infrastructures. For these reasons, both parties rely heavily on intermediaries, whose job is to go to the different villages and gather the RCN. However, this leads to harmful practices, such as intermediaries pressuring isolated farmers on the purchase price, since they are the only sale channel those producers have. From the processors' side, they frequently must loan money to intermediaries for them to be able to do the RCN gathering, and many end up fleeing with the money. A director from a large industrial unit in Mozambique even stated that these thefts are already included in their business model considerations.

Given our previous considerations, solving this intermediary dependency problem should be done through contextual measures that would help increase transparency and farmers' access to information. For instance, the Mozambican government could create a platform like the Indian Unified Market Platform, where producers and processors would share information regarding the amount of RCN available and its prices. Although it would have to be adjusted to Mozambique's technological reality, the platform could help remove power from the intermediaries, as they would be unable to deceive or pressure farmers, and processors would have a clearer picture of their routes and the work they did. Furthermore, the government could

also create a license for intermediaries, which would register their trustworthiness through producers' and processors' feedback. This would eventually filter the worse intermediaries from the supply chain, as the industrial players would not be willing to employ intermediaries unless they had a clear record.

The last suggestion would be an adaptation of the existing protectionist policies, which defend the internal processing industry by artificially reducing demand from external competition. Inspired by the previously analyzed study from Akkaya et.al, a switch from taxation to subsidization could be employed. Instead of the current export taxes, internal processors would be given a subsidy by the government for the purchase of local RCN. This would still give the Mozambican processing industry an advantage over its competition, but it would not hurt the farmers' position in the market as demand and the willingness to pay from their buyers would both be higher.

Conclusion

The basis for this thesis was an internship at Pakka Foundation – a Swiss organization involved in a project to promote the Mozambican cashew supply chain. Its goals are to improve farmers' efficiency, connect them to the market and incentivize the production of organic and fair-trade certified cashews. Pakka would act as the final purchaser of cashew kernels, which would be made from the raw cashew nuts produced by farmers in the project. During 3 months, in-depth research was made through existing reports and studies, internal data, and numerous online interviews with stakeholders from all points of the value chain. A major struggle during this research was the reliability of the information. Frequently, different sources of information presented conflicting views or even different and unrealistic data. Several stakeholders pointed out that forgery and corruption were very frequent practices, which can be an explanation behind this misinformation. Together with Pakka, the internships' conclusion was that the business landscape was too hostile and uncertain for the Foundation to advance.

Afterward, to understand how governmental action can shape the agricultural sector, different studies on this specific type of policy-making were analyzed, from both developed and developing countries. Then, they were summarized by the connecting challenges that farmers may face with the tools that governments use to solve them. Price uncertainty can be solved by providing a subsidy when prices fall, and yield uncertainty by a subsidy when farmers' revenues fall. Furthermore, both can be helped by having the government act as a buyer and establishing a minimum price. To incentivize innovation, subsidies, taxes and a combination of both can be used, depending on the other goals of the policy and the farmers' financial situation. As for intermediary dependency, contextual measures must be applied with the goal of increasing transparency and removing market power from these stakeholders.

Before recommendations, the cashew policies in Mozambique were approached, with an initial analysis being conducted on the existing ones – chemical pulverization subsidies, reference price, export taxes, and quantity limit to exports. Despite what theory would indicate, chemical subsidies were found to be inefficient, as they faced high amounts of corruption and an implementation problem. On the other hand, reference price seems to have a positive impact in protecting farmers' cashew prices. As for both exports policies, they seem to negatively impact the market position of farmers, as they artificially decrease demand for their products.

Finally, a new landscape of policies was suggested for the cashew market in Mozambique, by providing ideas for two new policies and the adaptation of two existing ones. To increase cashew trees' productivity, a subsidy for the plantation of new trees was proposed, as their oldness is one of Mozambique's most critical challenges. Additionally, an adaptation of the chemical subsidy scheme was also recommended, in an attempt to solve the frequent corruption issues. Regarding intermediary dependency, a centralized marketplace and increased channels of communication between farmers and processors were suggested. Lastly, an adaptation of the

export tax to a subsidy policy for farmers was also proposed, as a way to maintain the protection over internal cashew processors, while also improving the farmers' market position.

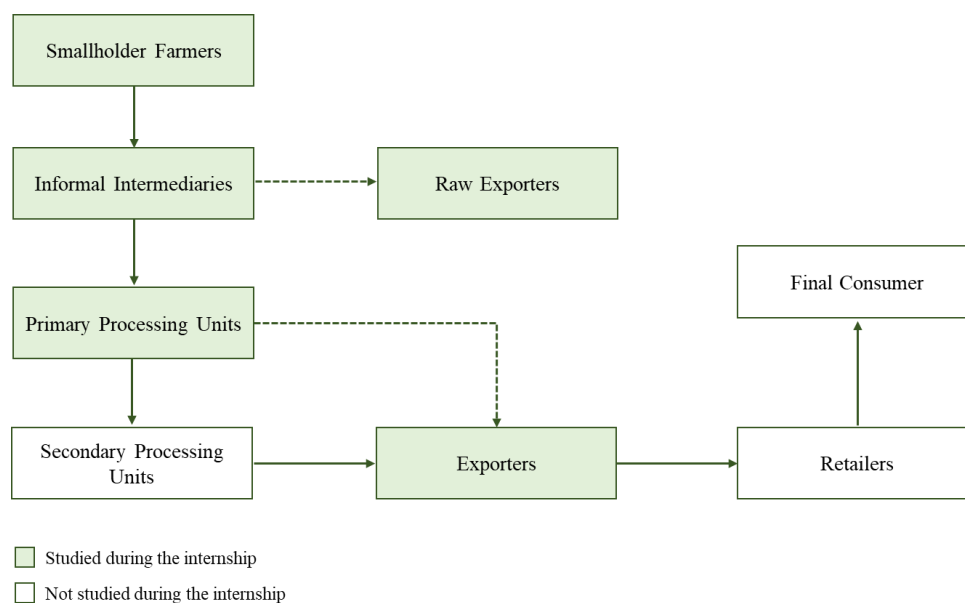
Hopefully, this thesis has been able to provide relevant and practical insights over the cashew value chain in Mozambique and combine them with the existing knowledge in the field to propose sound solutions and relevant material for further discussions. Mozambique is a country with large agricultural potential, with much of it yet to be leveraged. Doing so might make it possible to improve the lives of impoverished and struggling farmers, and elevate the conditions of their rural communities. To achieve this, it will be critical to improve farmers' agricultural knowledge, strengthen their connections to the market and implement resilient and transparent plans which leave little space for harmful practices.

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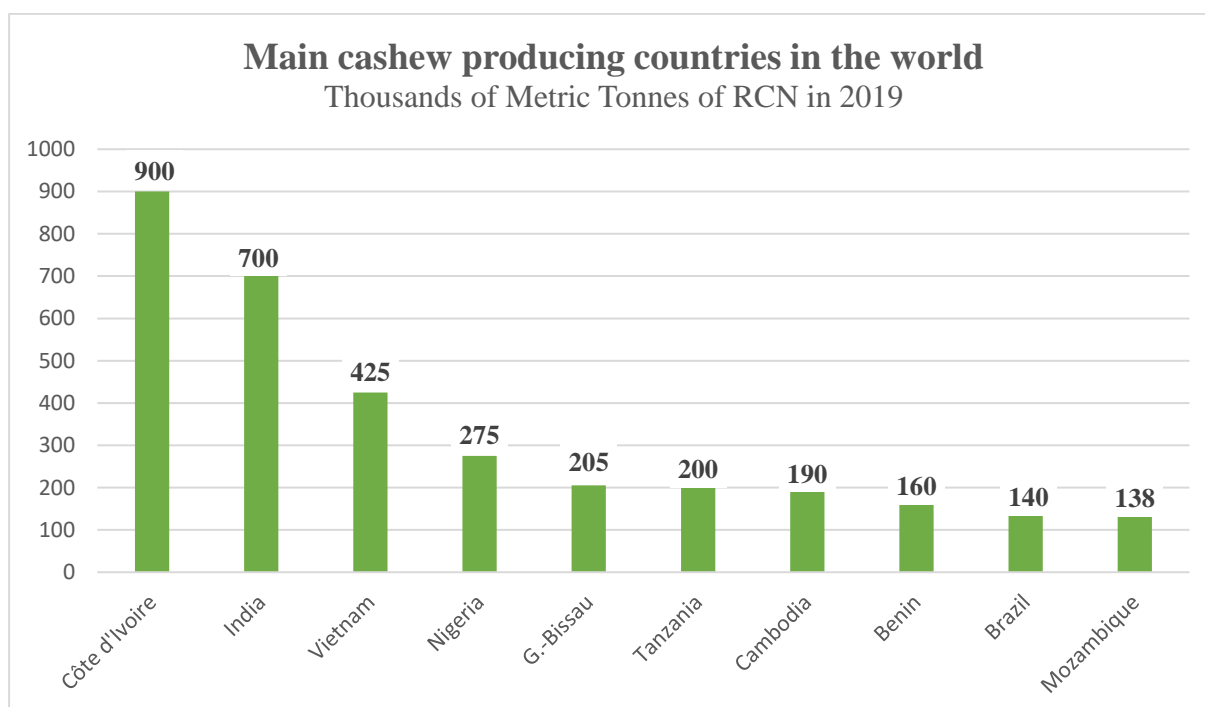
Appendices

Appendix A – Cashew Journey



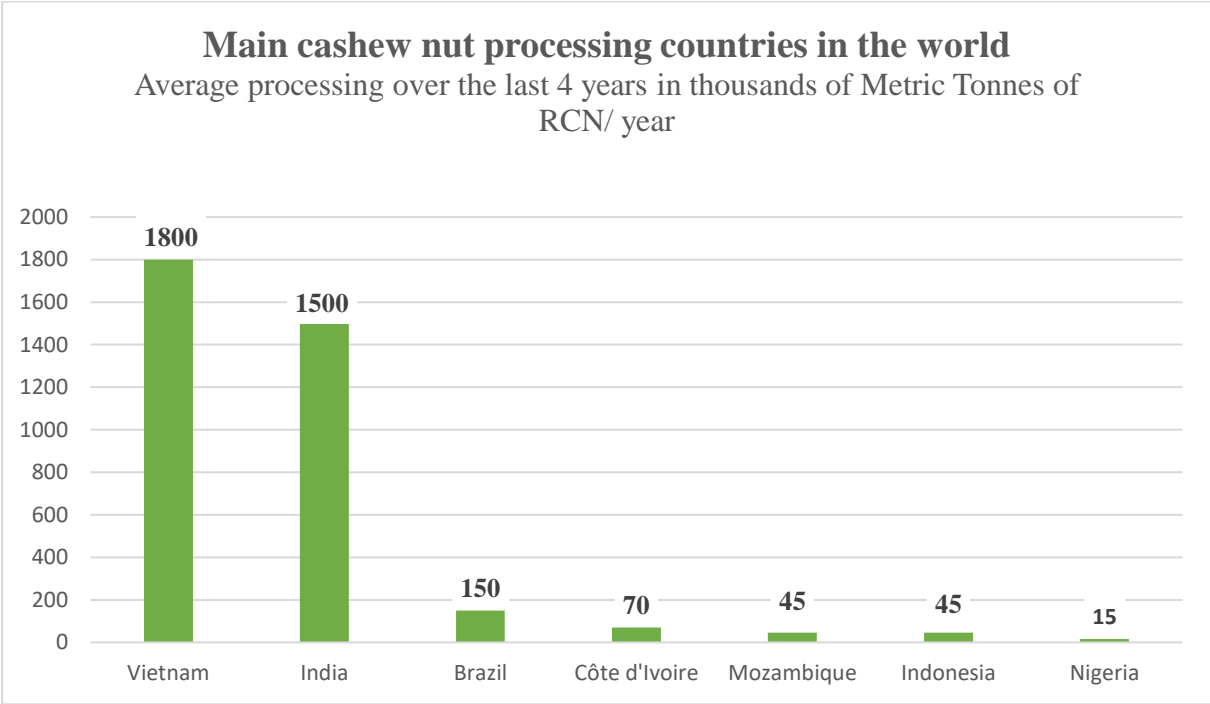
Appendix B – Main Cashew Producing Countries in the World in 2019

Source: Service n’kalô



Appendix C – Main Cashew Processing Countries in the World

Source: Service n’kalô and Incaju



Appendix D – Farmer mapping in the project

Source: Internal data and interviews.

Farmers obtaining organic certification in 2020-2021			
	Nampula	Cabo Delgado	Total
# Farmers	172	352	524
# Trees	2,440	8,628	11,068
Production (kg)	14,923	37,602	52,525
Tree Yield (kg)	6.1	4.4	4.7
Trees per farmer	14	25	21
Average production per farmer (kg)			100
Farmers needed to make 80t of RCN			798
Conventional production* (kg)			298,310

*assuming a total of 3500 farmers in the project

Appendix E – Biospray Efficiency Study

Source: Internal data and interviews.

Biospray Efficiency Study	
Trial in Nacoma	
Concentration Rate	Average Tree Yield (kg)
5%	4.80
7.5%	3.90
10%	4.00
15%	2.70
Trial in Itoculo	
Concentration Rate	Average Tree Yield (kg)
5%	4.73
7.5%	2.17
10%	3.35
15%	3.40

Appendix F – Cost Structure of Industrial Cashew Processing Unit – 5,000 tonnes of capacity

Source: Nitidia 2020

	Total Costs (TC)	Share of TC
Inputs	MZN 51.0	68.1%
Fixed Costs	MZN 14.1	18.8%
Variable Wages	MZN 2.5	3.4%
Financial Costs	MZN 5.2	6.9%
Other Costs	MZN 2.2	2.9%
Total	MZN 74.9	100.0%

*at the time of the study USD to MZN was 64.51

5 kg of RCN	MZN	374.5
Converted to USD	\$	5.81
Selling Price	\$	7.70
Margin		25%