



CHALMERS



Mapping the major challenges of crop transition in Malawian agriculture

A qualitative analysis of the main challenges with transitioning to sunflower production

Bachelor's thesis in Industrial Economy

ERIC JOHANSSON
JOHAN HEGARDT
LEONARD HEDENBLAD

MARTIN LILLÖ
MAX SONNELID
WILLIAM GERLE

**DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS
DIVISION OF INDUSTRIAL ENGINEERING AND MANAGEMENT**

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A qualitative analysis of the main challenges with transitioning to sunflower cultivation

Kartläggning av de främsta utmaningarna vid skifte av gröda i det malawiska jordbruket.

En kvalitativ analys av de huvudsakliga utmaningarna vid övergång till solrosodling

ERIC JOHANSSON
JOHAN HEGARDT
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WILLIAM GERLE

@ERIC JOHANSSON, 2020
@JOHAN HEGARDT, 2020
@LEONARD HEDENBLAD, 2020

@MARTIN LILLÖ, 2020
@MAX SONNELID, 2020
@WILLIAM GERLE, 2020

Bachelor's thesis TEKX04-20-22
Department of Technology Management and Economics
Chalmers University of Technology
SE-412 96 Gothenburg
Sweden
Telephone + 46 (0)31-772 1000

Cover: The picture represents a sunflower that is being grown in Malawi. The picture was taken during the field study in Malawi, 2020.

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SUMMARY

Problem

Tobacco cultivation has several disadvantages on both an individual and national level, creating long-term social, economic, health, and environmental drawbacks. Tobacco is the largest agricultural export good in Malawi. The sunflower with its high nutritional value and positive economic externalities, seems to be a suitable crop to cultivate in the country. Although sunflower cultivation is increasing, it is at a slow pace and it still constitutes a modest fraction of Malawi's agricultural sector, not even covering the domestic demand. This indicates that there are challenges associated with the transition between the two crops. With the lack of research covering this area, it seemed appropriate to investigate which these challenges are and how they can be solved.

Purpose

This study aims to develop a deeper insight into the agricultural sector in Malawi, focusing on the two crops tobacco and sunflower. These insights will be used to understand why sunflowers are not grown to a greater extent in Malawi and, more specifically, the main underlying challenges of switching from tobacco to sunflower cultivation. Moreover, this study will investigate solutions to overcome these transition challenges.

Theoretical framework

The theoretical framework mainly focuses on relevant economic theories and models such as supply and demand, externalities, and path dependency. Since these theories are often derived from scholars in developed economies, which Malawi is not classified as this chapter also has a special emphasis on developing economies. Human capital, institutions, and managing risk are some areas described within this area.

Method

The method was based on an inductive approach, which means that the theoretical framework, as well as the literature, was chosen based on the data collected through the interviews. This was well suited to a thesis which is largely based on information gathered from interview subjects during a field study in Malawi. In addition, a literature study was conducted.

Results and implications

The thesis resulted in the identification of five challenge areas for Malawian farmers to switch from tobacco cultivation to sunflower cultivation: the farmers' short-term economic incentives, limited financial resources, education, and information, gender inequality and

corruption and deficient governmental institutions. Furthermore, solutions to these challenges were proposed. It is found that the challenge of farmers' short-term economic incentives could be solved by implementing tax on tobacco and subsidising sunflower seeds. The subsidisation is a subject for corruption and it is therefore suggested to be earmarked to mitigate the risk for corruption. To further overcome the identified challenges, it is found that creating farmer cooperatives, making educational efforts towards women to further empower them, and invest in irrigation systems could facilitate the transition towards sunflower cultivation.

Keywords: sunflower, oil, Malawi, market failure, corruption, tobacco, agriculture

SAMMANFATTNING

Problem

Tobaksodling medför flera nackdelar på individnivå såväl som på nationell nivå, vilket skapar långsiktigt negativa konsekvenser för det sociala, ekonomin, hälsan och miljön. Tobak är den största exportprodukten för Malawis jordbrukssektor. Solrosen, med dess höga näringsvärden och positiva ekonomiska externaliteter, ter sig som en lämplig gröda att odla i landet. Även om solrosodling ökar, sker det i en långsam takt och utgör fortfarande en blygsam bråkdel av Malawis jordbrukssektor. Produktionen täcker inte ens den inhemska efterfrågan. Detta indikerar att det finns utmaningar kopplade till att skifta mellan dessa två grödor. Då forskning inom detta område saknas, verkade det lämpligt att undersöka vilka dessa utmaningar är och hur dessa kan lösas.

Syfte

Denna studie syftar till att utveckla djupare insikter om Malawis jordbrukssektor genom att fokusera på de två grödorna tobak och solrosor. Dessa insikter kommer användas för att förstå varför solrosor inte odlas i en större omfattning i Malawi och, mer specifikt, de främsta underliggande utmaningarna för att skifta från tobaks- till solrosodling. Dessutom kommer denna studie undersöka lösningar för att motverka dessa utmaningar.

Teoretiskt ramverk

Det teoretiska ramverket fokuserar främst på relevanta ekonomiska teorier och modeller så som utbud och efterfrågan, externaliteter och stigberoende. Eftersom dessa teorier ofta härleds från forskare i utvecklade ekonomier, vilket Malawi ej klassificeras som, har detta kapitel även ett särskilt fokus på utvecklingsekonomier. Humankapital, institutioner och riskhantering är några av de ämnen som beskrivs.

Metod

Metoden baserades på en induktiv ansats, vilket betyder att det teoretiska ramverket samt litteraturen valdes baserat på datan som samlades in med hjälp av intervjuer. Detta var lämpligt för en uppsats som till stor del är baserad på information hämtad från intervjuobjekt under en fältstudie i Malawi. Dessutom genomfördes en litteraturstudie.

Resultat och implikationer

Uppsatsen resulterade i att fem övergripande utmaningar som malawiska bönder ställs inför vid skifte från tobaksodling till solrosodling identifierades: bönders kortsiktiga ekonomiska incitament, begränsade finansiella resurser, utbildning och information, jämställdhet samt korruption och bristfälliga statliga institutioner. Därefter presenteras potentiella lösningar till dessa utmaningar. Det konstaterades att utmaningen gällande bönders kortsiktiga ekonomiska incitament skulle kunna lösas genom att införa skatt på tobak och att subventionera solrosfrön. Subventioneringen skapar risker för korruption, dessa skulle kunna minskas genom att göra subventioneringen öronmärkt. För att ytterligare motverka de identifierade utmaningarna konstaterades det skiftet till solrosodling kan underlättas ytterligare genom att skapa jordbrukskooperativ, investera i bevattningssystem samt att utföra utbildningsinsatser riktade mot kvinnor för att på så sätt stärka deras roll i samhället.

Nyckelord: solrosor, olja, Malawi, marknadsmisslyckande, korruption, tobak, jordbruk

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The image shows six handwritten signatures in blue ink, arranged in two rows of three. The signatures are stylized and cursive. The top row contains three signatures, and the bottom row contains three signatures.

Gothenburg, May 2020

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1

Introduction

Malawi is the eighth poorest country in the world, according to Tasch (2015), and their population suffers from severe nutritional deficiencies, mainly due to lack of fat and proteins in the diet. Yet, tobacco cultivation accounts for the largest share of their agricultural sector, despite its many disadvantages. This report examines whether sunflowers with its dense nutritional values and positive externalities could partially replace tobacco cultivation in Malawi and what effects it could have.

This chapter intends to explain necessary parts of the thesis' topic, to give an understanding of the underlying facts that will be used throughout the report. The chapter is structured to give a general overview of Malawi and the crop investigated in the report, namely sunflowers, moving on to explaining the agricultural situation and what the sunflower production looks like in Malawi today. As the report specifically investigates the challenges of switching from tobacco production to sunflower production, a brief overview of the tobacco production in Malawi is also given. Furthermore, the purpose of this study along with the problem analysis and the research questions will be presented. But first of all, this section will initially be introduced by discussing the writers' first encounter with the problem of the thesis.

1.1 The origin of the report

The foundation for this thesis is a Lund based startup called SunFeeds. The current aims of this report are sprung from an initial objective to conduct a study for SunFeeds, where the team would look into the effects of local production in Malawi of SunFeeds' product which is described below. Although that objective has changed towards today's purpose of the thesis, the outcome of the thesis could still be of relevance to SunFeeds.

According to one of the founders, Iris Bjerken (personal communication, 4 September 2019), SunFeeds is a company developing a new nutritional replacement food aimed for children (aged 6-59 months) who suffer from the most severe stage of malnutrition, severe acute malnutrition (SAM). SunFeeds is based on an already stationed concept, *Ready-To-Use Therapeutic Food* (RUTF), that is proved to work and saves millions of lives each year from the most acute stage of malnutrition.

RUTF are portable, shelf-stable, single-serving foods that are used in a prescribed manner to treat children with SAM, informs So and Swaminathan (2009). The RUTF-product that is almost exclusively eligible today is a peanut-based paste with high energy-density and adequate vitamins and minerals. A test manufacturing as well as calculations prove that the nutritional value of SunFeeds' sunflower-based paste measures up to the nutritional composition requirements of RUTF. SunFeeds does not have the aim to out-compete the already stationed product, the aim is rather to offer an additional alternative. With more alternatives, and so also a greater amount of replacement food, Sunfeeds could save more lives and contribute in the fight for a world without starvation, says Bjerken (personal communication, 4 September 2019).

1.2 Background

This section will give a brief overview of Malawi, the sunflower, and the agriculture in Malawi in order to create an understanding of the issues in the problem.

1.2.1 Malawi

Malawi is a landlocked country situated in the southeast of Africa. It has an area of 118 000 km², of which one-fifth consists of Lake Malawi. The country has varied vegetation with savannas in the dry, lowland areas, woodlands covering the plateaus of central Malawi and forests, and grasslands extending over the highlands and mountains. Temperature is ranging in the 20s °C during the whole year with a dry season from May to October and a wet season from November to April. (Britannica Academic, 2020)

The population number is 18 million as of 2019, but is growing at a rate above the average for sub-Saharan Africa. Three-quarters of the population are Christian and one-fifth is Muslim. Chichewa and English are the main languages according to Nationalencyklopedin (2019). The life expectancy is just above 60 years, with 14 percent of the population infected by AIDS and a big shortage of both medical staff and supplies as contributing factors to this. Britannica Academic (2020) informs that as a consequence, half of the population is under 15 years. The inflation rate in Malawi was approximately 9 percent in 2019, as reported by (IMF, 2019).

Simultaneously as Malawi has one of the highest population densities in southern Africa, it is also one of the least urbanised countries with 83 percent living in rural locations as of 2018. Traditionally, the population was organised in small villages consisting of the extended family. Urban development first began during the colonial era and is currently continuing at a rapid rate. This is however causing health issues because of the increase of informal housing with very low standards. (Britannica Academic, 2020)

In the 16th century, the precursor states of today's Malawi were formed. Swahili-speaking people and the Yao people gained influence in the area in the middle of

the 19th century and started practising slave trade. In the latter part of the century, more precisely in the 1880s, the British occupied the country and eventually formed the colony Nyasaland in 1891. Although the country's infrastructure developed a lot during the British rule, the welfare of the Malawian people did not develop to an equal extent. This eventually resulted in Malawi gaining independence in 1963. Furthermore, in 1994, the former one-party system was replaced with a multi-party system. (Britannica Academic, 2020)

According to World Food Programme (2018), the main livelihood in Malawi is agriculture, which also makes the Malawians very sensitive to climate change. Due to recent changes in climate Malawi suffered from floods, droughts, and crops being demolished, which has led to more severe starvation states Jones (2015). As UNICEF (2018) describes, Malawi currently has high levels of malnutrition amongst children under five years and 23 percent of all child death cases are related to under-nutrition. The malnutrition has had a negative impact on health and education outcomes, explains (Jones, 2015). This is one of the many contributing factors to Malawi being ranked 170 of 188 according to the United Nations Development Programme Human Development Index. This index measures countries average results on expected longevity, education, and income, suggests (Globalis, 2019).

1.2.2 The sunflower production

Sunflower production has been increasing worldwide since the '60s. The oil extracted from the sunflower seed is a major source of vegetable oil all over the world. The sunflower thrives in high water-holding capacity soils that should be well-drained. The pH level is preferably around neutral, somewhere between 6.5 - 7.5, but the sunflower could adapt to other soil conditions as well. The harvesting usually takes place about 120 days after planting, but the cultivation could vary in length depending on temperature, moisture, and fertility levels. (NDSU Extension Service: N.D. Agricultural Experiment Station, 2007)

If 100 kilograms of sunflower seeds were to be processed, a total of 25 kgs of by-products, 35 kgs of high-protein meal and 40 kgs of oil would be obtained. The seeds could be processed into packaged confectionary seeds or as food ingredients. Packaged raw seeds could be sold directly to consumers as a snack or to firms that use sunflower seeds in their production, bread companies among else. In addition to this, low-quality sunflower seeds may be used as bird seeds. (Agricultural Marketing Resource Center, 2019)

1.2.3 Agriculture in Malawi

Agriculture constitutes 30 percent of Malawi's Gross Domestic Product (GDP) and 80 percent of the employment in Malawi comes from agriculture. Tobacco is the biggest agricultural export, representing 60 percent of Malawi's total exports in 2015. Maize is another important crop and 80 percent of Malawi's smallholders grow maize. The lack of diversification of crops in Malawi is a problem since it makes the agricultural sector vulnerable to changes in demand from the market

and impoverishes the farmlands. (Food and Agriculture Organization of the United Nations, 2015)

1.2.3.1 Sunflower cultivation

The sunflower-production in Malawi peaked in the 1990s, but the production was drastically reduced when a major buyer left the market. The industry has now reached the same numbers as during the 1990s with a production quantity of 15 736 metric tons (mT) during 2016, this development can be seen below in Figure 1.1. However, the annual sunflower demand in Malawi is estimated to be somewhere between 30-40 thousand tonnes. The demand that exceeds the national production of sunflowers is imported from neighboring countries. (Markowitz, 2018)

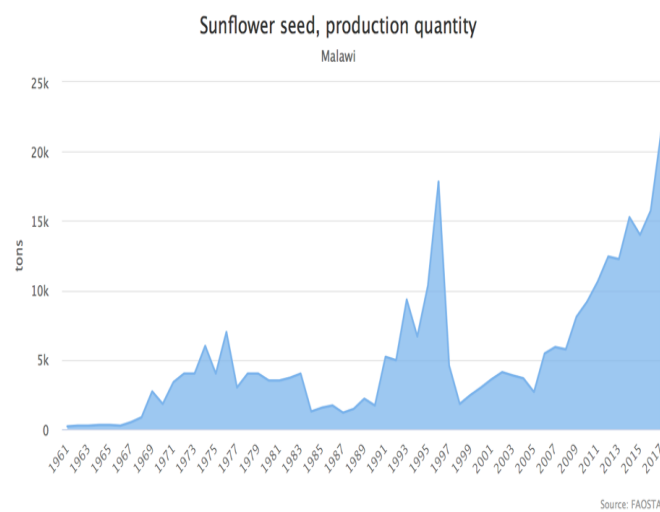


Figure 1.1: The sunflower production from 1961 to 2017 in Malawi

Although the production has increased the sunflower-production still constitutes a modest fraction of Malawi's production of agricultural commodities, for example the soybean-production reached 132 417 mT in the country in 2016. The sunflower-production comes mainly from smallholders, this is due to the fact that sunflower being an easily manageable crop that smallholders use to cycle and back up other crops such as maize. A constraint to more sunflower being locally produced is the fact that imported sunflower oil from South Africa is both cheaper and of better quality. The local farmers also face an informal competition due to corruption which allows palm oil to be smuggled across the border at a huge discount. (Markowitz, 2018)

1.2.3.2 Tobacco cultivation

The tobacco production in Malawi can be traced back to the 1920s. However, starting in the 1960s, the production expanded rapidly. In the early 2000s, Malawi became one of the ten largest tobacco producers in the world. Until 1989, the

tobacco production was strictly controlled by the government, which promoted large-scale farming by mainly estates. Therefore, smallholders started farming tobacco only starting from the 1990s. Most of the tobacco farmers, large estates as well as smallholders, are using a crop rotation pattern (i.e. different types of crops are grown in different periods in order to keep the soil from being depleted) and at the same time, they have a big simultaneous production of maize. (Food and Agriculture Organization of the United Nations, 2003)

1.3 Problem

This section aims to use the information gathered from unstructured interviews, as well as studies of sunflowers and tobacco farming in Malawi, in order to extract a problem that should be examined by this study. It is divided into a problem explanation of tobacco farming together with the benefits of sunflower cultivation. The goal with the section is to emphasise the importance and relevance of decreasing the widespread tobacco cultivation in Malawi, explain why the sunflower is a suitable alternative crop, and to create a foundation on which this study's research question can be produced from.

1.3.1 Potential problems of tobacco cultivation

Market liberalisation actions and the fact that multinational tobacco companies are lobbying and making large investments in tobacco promotes development of tobacco agriculture in low-income countries, such as Malawi. These countries are often unable to oppose the large multinational tobacco companies due to limited financial and legislative capabilities. The cultivation of tobacco focuses on short-term economic benefits, neglecting the long-term social, economic, health, and environmental drawbacks. (World Health Organization, 2015)

Tobacco cultivation is harmful to farmers in several ways. First and foremost, Boseley (2018) emphasises the workers' risk of being nicotine poisoned or getting green tobacco sickness, a risk that is not present for other major crops in Malawi, e.g. sunflower and maize. World Health Organization (2015) proposes that a part of the produced tobacco is consumed in Malawi which exposes the Malawian population to the health risks of tobacco which includes lung cancer, cardiovascular disease, and pulmonary disease. According to Boseley (2018), these risks are getting even more severe as child labour is prevalent among Malawian tobacco production.

Since tobacco cultivation involves the use of chemicals, it also has many environmental consequences. The chemicals often affect drinking water due to run-offs from the plantations. The tobacco plant also takes up soil nutrients to a greater extent compared to other major Malawian crops, which leads to soil depletion. (World Health Organization, 2015)

From the social and economic perspective, given that the tobacco grown in Malawi is extensively exported, they miss out on the value chain. If the crop had been

refined within the Malawian borders, jobs could have been created. Job creation is a key factor for Malawi in order to reduce poverty and improving people's lives. (The World Bank, 2018)

1.3.2 Potential benefits of sunflower cultivation

There are several benefits to cultivate sunflowers. Firstly, it's an edible and nutritious crop with a high degree of utilisation. Up to 90 percent of the sunflower seed can be used, partly as edible oil and partly to produce oil cake. The nutritive value of the sunflower has a variety of mainly fat as well as protein and carbohydrates. The fact that sunflower seeds consist of nutrient values that Malawian inhabitants are suffering from a lack of, makes it a suitable crop to cultivate in the country. (Markowitz, 2018)

Furthermore, the crop has a low density and therefore low transport cost. This in combination with an underdeveloped value chain implies that there are a lot of opportunities to explore and make use of. Finally, the sunflower is an ideal crop for rotation with e.g. maize which, as of today, is the most common crop in Malawi. Additionally, it can be used as a back-up crop since it can be planted late in the season. (Markowitz, 2018)

At the same there are many benefits with the sunflower there are some shortcomings namely, the sunflower needs a lot of water to grow which creates uncertainties for farmers without advanced irrigation systems. Even after successful cultivation of the seed, the refining process is both highly capital as well as knowledge-intensive. (Markowitz, 2018)

1.3.3 Problem formulation

Tobacco cultivation has several disadvantages, both directly for the farmers in the form of nicotine poisoning, but also for the Malawian society since it neglects the long-term social, economic, health, and environmental drawbacks that the cultivation entails. Nevertheless, tobacco is the largest agricultural export good in Malawi, which clearly indicates a problem. At the same time, despite several advantages over tobacco such as high nutritional value, the sunflower appears to be overlooked which can be proven by the fact that Malawi can not even meet domestic demand.

Although sunflower cultivation is increasing, it is at a slow pace and it still constitutes a modest fraction of Malawi's agricultural sector. This indicates that there are challenges associated with the switch between these two crops. This makes it interesting to investigate which these are and how they can be solved, which is why this report becomes relevant.

1.4 Purpose

This study aims to develop a deeper insight into the agricultural sector in Malawi, focusing on the two crops tobacco and sunflower. These insights will be used to understand why sunflowers are not grown to a greater extent in Malawi and, more specifically, the main underlying challenges of switching from tobacco to sunflower cultivation. Moreover, this study will investigate solutions to overcome these transition challenges. This culminates in the following research questions.

1.5 Research questions

In order to achieve the purpose of the report and respond to the described problem analysis, the following research questions were selected to answer;

1. What are the main challenges for Malawian farmers to switch from tobacco cultivation to sunflower cultivation?
2. What solutions are there to overcome the challenges related to the transition from tobacco cultivation to sunflower cultivation?

1.6 Delimitations

Although the interviews and literature studies were performed in a way to maximise the number of encounters of important challenges and solutions, finding them all was an impossibility. The purpose tries to emphasise that only the *main* contributing challenges and solutions were focused on during this study due to the delimitation described above. The challenges selected were rather a result of careful consideration of what the interview subjects emphasised and what factors multiple subjects were discussing. The solutions selected can be considered a selection by the writers of which solutions seem to have had the most significant impact on similar challenges in different countries or situations.

2

Theoretical framework

This chapter will describe the theoretical framework that together with the introduction, case studies, and results will form the basis for the discussion in chapter 6. The chapter will mainly focus on relevant economic theories and models, with a special emphasis on developing economies.

2.1 Market economy

This section will highlight important theories regarding market economy, starting with supply and demand, followed by market failures, the Cob-Web design, and importance of good institutions.

2.1.1 Supply and demand

A market is a place where a buyer and seller meet. The size of the market can range from a minor store where people meet physically to a big online store where the buyer and the seller actually never encounter each other. A market can sell commodities as well as services and can differ in many ways, but there is always one thing that all markets have in common - a supply side and a demand side. The supply side is what the manufactures and suppliers have to offer, and to what price. The demand side is a representation of what the customers want to pay for and, how much they are willing to pay. To visualise this, Figure 2.1 displays the supply side as well as the demand side of a market. (Eklund, 2013)

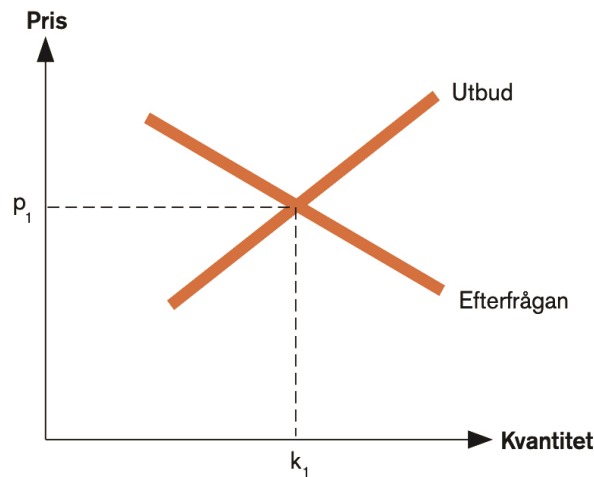


Figure 2.1: A representation of the demand and supply side. Retrieved from (Eklund, 2013)

The more attractive an item or a service is for a population, the higher the demand. The income of the population is also an important factor in how big demand is. At the same time as demand is depending on several factors, so does the supply side. The most important factor is production costs. The production cost is dependent on how production is organised, in combination with what internal efficiency a company has and what technologies they are able to utilise. What both sides have in common is the price, which is the deciding factor of whether an item is sold or not. As seen in figure 3.1 a lower price indicates a higher demand and vice versa. This is however based on the assumption *Ceterius paribus* and therefore other factors and complexities are not taken into account. (Eklund, 2013)

If the market is working properly, the supply and demand will intersect as displayed in the graph, which will lead to optimum utilisation of resources. When an unrestricted market is not leading to the optimal utilisation, it is known as a market failure. (Mankiw and Hakes, 2004)

2.1.2 Externalities

One of many explanations as to why a market failure occurs is that the price mechanism does not work properly. This means that the processes which set the price on a specific product or service in a branch or society are faulty. A phenomenon that is a consequence of a broken pricing mechanism is an *externality* and this is when a cost or benefit of an economic-related activity is experienced by an unlinked third party. More specifically this is when the external benefit or cost is unreflected in the total benefit or cost of a service or good which makes markets inefficient and resulting in market failures. (Eklund, 2013)

In general, there are two types of externalities: negative and positive. An externality

is defined as negative when the net welfare is below zero. This exists when the marginal cost to society related to a particular economic activity is greater than the society's experience of marginal benefit. Contrarily, a positive externality is when the marginal benefit of a certain economic activity is greater than the marginal cost. (Eklund, 2013)

Granstrand (2016) suggests several solutions to correcting and handling with externalities. All these solutions are built on the concept of internalising which means incentivising economic agents to consider the externality in their market decisions. Examples of solutions range from governmental solutions, such as instituting taxes, subsidies, and regulations to market solutions such as creating a market for tradable permits.

2.1.3 The Cob-Web model

The Cob-Web model describes why prices might be subject to periodic fluctuations in markets. It is based on a lag that occurs between the supply and demand side, which generates a longer time for the price to get adjusted properly. According to Granstrand (2016) the adjustment lag occur because of the time it takes for buyers and sellers to get access to correct information about the current price and to decide whether to make a deal or not. If the buyer is *more* price sensitive than the seller, the price will eventually converge. If the buyer is *less* price sensitive than the seller, the price will continue to diverge.

Furthermore, Granstrand (2016) explains the problem by providing an example from the agricultural markets. The example, which is illustrated in Figure 2.2, is using discrete time periods $k = 1, 2, \dots$ and describes how a farmer in $k=1$ makes a decision on to what extent to grow certain crops. That decision is based on the demand d_1 when $k=1$, but the crop is harvested and sold at $k=2$. If the demand has changed during this period, the price will be either higher (p_2) or lower (p_1) than the farmer initially expected when making the decision. To conclude, the bigger the time lag is between supply and demand, the more incorrect will the price be, and depending on the price sensitivity of the two actors, the price will either be more and more inaccurate, or it will eventually converge into an equilibrium.

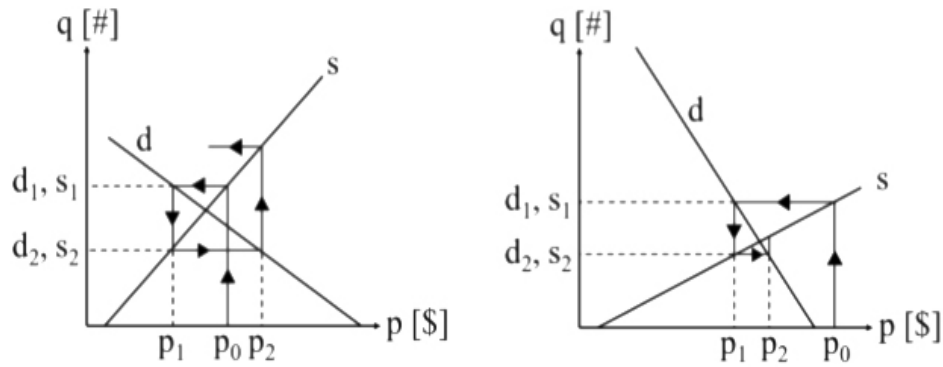


Figure 2.2: The left graph shows how a price diverges and the right shows how the price diverges into an equilibrium. Retrieved from (Granstrand, 2016).

2.1.4 Importance of good institutions

Eklund (2013) states that good institutions are an important tool for mitigating corruption and in turn create a foundation for economic growth. Legislation, tax system, religion, and culture are some examples of these institutions. More specifically, economic growth is derived from the transformation pressure that a free market economy puts on businesses and consequently forces them to innovate and improve their productivity. However, a precondition for the existence of a market economy, free from corruption that is prohibiting the market forces, is institutions that are enforcing fair competition and promoting growth. To exemplify the importance of good institutions, it is often stated that institutions as protestant work ethics, capitalism, and freedom of trade were amongst the strongest forces for Europe's industrialisation and subsequent economic growth.

One such institution that especially could be mentioned is social capital or, by other words, general trust in society. Without social capital, entered agreements are rarely kept. As a consequence, the risk for corruption increases and thus few people dare to take risks and invest in businesses. Furthermore, there needs to be a business climate in place which incentivises businesses to start and grow. The tax system should let businesses experiment and make profits after having invested time, knowledge, and capital. Authorities also need to have an understanding of the needs of businesses in order to be able to promote entrepreneurs. (Eklund, 2013)

2.2 Path dependency and system lock-in

Path dependency is a concept stating that the history of an organisation plays an important role in its future choices. If an organisation is path dependent and has historically developed in a certain way, it will probably continue to do so. This is

due to the self-reinforcing properties where initial steps in a specific direction cause further steps in that direction to be more attractive. Over time, as an organisation has taken more and more steps in this direction, it will be difficult and expensive to change direction. In the end, this can lead to inefficient choices and the organisation embarking on the wrong path. An example of path dependency is the early adopted QWERTY keyboard design which still prevails over the Dvorak keyboard design even though it is a less efficient format. (Mahoney, 2000)

These self-reinforcing sequences describe the term of increasing returns to adoption. Figure 2.3 illustrates the situation where two competing systems with different rates of increasing returns lead to a system lock-in. Network effects are an important concept here and can be defined as higher returns to the next adopter of a system with a higher number of previous adopters to the same system. Since system B is initially the superior system it will be adopted forever because of network effects even though system A eventually, with enough adoptions, would be the superior system. This situation when an ultimately superior system is locked out demonstrates a market failure that motivates the consideration of some sort of overriding coordination such as tax incentives or subsidies. (Granstrand, 2016)

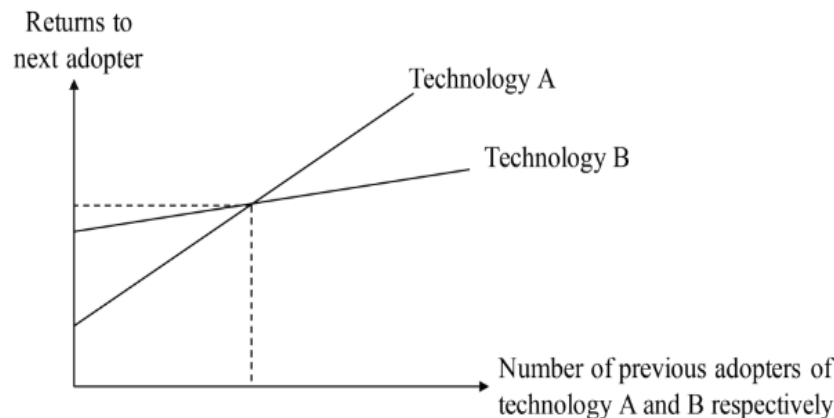


Figure 2.3: The graph illustrates how the returns to the next adopter of a certain technology increases with an increasing number of previous adopters of the same technology. Technology A respectively B have different rates of such an increase in returns. Retrieved from Granstrand (2016).

2.3 Development economics

The above described theories are often derived from developed economies with functioning market forces and perfect information. In the following section, a number of factors and challenges characterising developing economies, such as the Malawian economy, will be addressed. The aim is to show why models from classical economic theories cannot always be applied directly to all different markets and economies, especially not them referred to as developing economies, and what needs to be taken into account when handling these.

2.3.1 Human capital

The debate on what measures are more effective to improve physical well-being in developing countries has been ongoing for a long time. The central question is if a higher income has a significant effect on parameters such as food consumption, nutrition, well-being, and health. If so, it may be more effective for governments and non-governmental organisations to focus investments in human capital to achieve long term income growth (i.e. *structural interventions*), instead of donating money to groups in society with specific needs (i.e. *welfare interventions*), in order to achieve goals for improving the well-being for poor people in the long run. (Barrett, 2007)

Empirical studies suggest that food in the developing world has an income elasticity of demand (i.e. if 10 percent of an income increase causes a 5 percent increase in demand, the income elasticity of demand is $5\% / \%10 = 0.5$) somewhere between 0 and 1. These findings imply a positive elasticity of demand but an inelastic demand curve: a higher income amongst poor people does increase food expenditures but not with the entire income increase. The studies find that the food demand elasticity moves closer to 1 when the current income level is lower. This means that the lower income a person has, a larger share of an income increase goes to food expenditures. Moreover, it has been found that the profitability and productivity of farms decrease during periods when calorie prices are high. This suggests that hunger amongst farmers lowers their productivity and therefore their income, resulting in a negative spiral of hunger and income. (Barrett, 2007)

Apart from nutrition, both health and education play important roles, both as productive inputs but also by their complementary effects on other production inputs. Education is a factor that often facilitates for disproportionate performance in the long run. This is partly due to the experience and knowledge sharing amongst people, which effects often become exponential, but also to the decreased adoption time to market opportunities and new technology. (Barrett, 2007)

Labour power, both physical and psychological, reflected in health, nutrition, and education is the main asset in production for the part of society with the lowest incomes. Investments in human capital and improvement of health, nutrition, and education for poor society members by creating income growth, rather than welfare interventions, is therefore a very important factor for eliminating extreme poverty and creating a sustainable society. (Barrett, 2007)

Eklund (2013) also mentions a benefit by focusing on a higher level of education to further invest in human capital, which is the difference in the growth of income over time. Figure 2.4 displays two curves. The first curve (A) is representing a person who decides to start working in an early stage of life, the second curve (B) represents a person who invests time and money to further educate herself. The darker area is the difference in income between the two people during the 2-5 years where one person is generating an income by working, and the other one is generating debt due to school tuition. The brighter part of the graph is representing the difference

between income growth over time. The person (B) who decided to invest in further education has a continuously increasing income during almost their whole career. The person (A) who instead started working early in life has a declining increase and eventually a decrease in salary. To conclude Eklund's example, looking at it long term, it is profitable to invest in education.

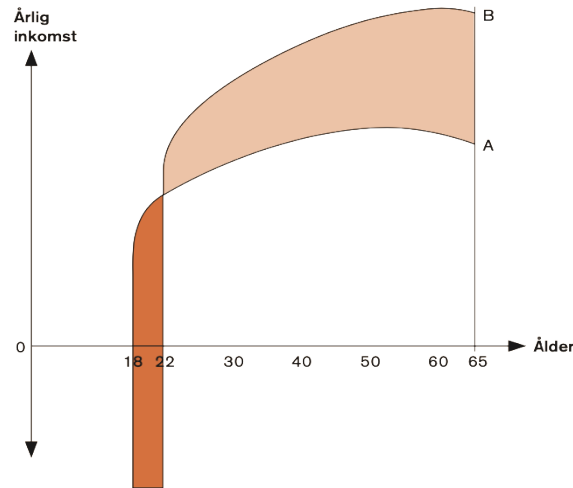


Figure 2.4: The graph displays the annual income for a person as the y-axis and the person's age as the x-axis. Person B has invested time in education in his younger years, while person A starting working early. The shadowed areas represent the difference in accumulated income for person A respectively B. Retrieved from (Eklund, 2013)

2.3.2 Technology

According to Barrett (2007), for an individual producer, in this case a farmer, there are three ways to increase output of production:

- By increasing input.
- With given input, increasing the technical efficiency of the inputs, e.g. by farming more on the given land area or by educating labour in working more efficiently.
- By improving technology with constant input and technical efficiency.

On a macro level, the last option is suggested by evidence to generate the highest return on investment measured in living conditions as well as long-term economic growth. However, on a micro level it appears that there are hinders to technology adoption. A few of them concern path dependency locking in inefficient technologies, short-term economic incentives causing a focus on developing technology for cheaper inputs rather than for the ones being most important for production, and lastly

poor information access regarding uncertainties and costs. Another aspect is that in markets where producers experience high inelasticity of demand (i.e. a price increase of a good cause no, or a small, change in the demand of that good) amongst their customers, such as the agricultural sector, almost all of the social gains from a technological enhancement benefit the consumers in form of lower prices. This makes the incentives low for producers to adopt new technology as there is little potential for increasing profits. However, a solution closer to the social optimum could be to let consumers, instead of private companies, to pay for technology development by tax revenues. (Barrett, 2007)

2.3.3 Managing risk

Agriculture constitutes the largest part of the labour market in many developing economies. The agricultural sector is subject to uncontrollable changes in climate and an inelastic demand leading to high variability in both harvests and price. This results in a majority of the actors in developing economies being exposed to often uncontrollable financial risks. Stabilising consumption and incomes through both governmental interventions and private risk management could improve liquidity and decrease risks for actors within the agricultural sector. Private risk management through e.g. sharing risk amongst cooperatives or by diversifying incomes poses problems as measures might only be attained by certain subgroups within the agricultural sector, which could increase segregation. (Barrett, 2007)

2.3.4 Market and non-market institutions

There are implications that markets are more important in developing economies than in high-income economies. In developing economies most companies are small-scale which demands large numbers of exchanges across different actors throughout the entire value chain. As opposed to high-income economies, where large corporations through formal contracts within the organisation can conduct a majority of these exchanges internally. In developing economies the exchanges are mainly constituted of spot market transactions, which are done with immediate delivery of the goods and are generally not founded by formal contracts. An example of this is trading a fruit on a market. This means that developing economies are dependent on the market for inter-company exchanges. (Barrett, 2007)

However, Barrett (2007) explains that markets are not used to the same extent in developing economies compared to in high-income economies due to the higher complexity of these markets. High transaction costs, information loss, and high risks causes actors to select out of markets and instead turn to semi-autarky (so to say, providing for their own needs). This means that in creating linkages in the value chain, markets are of high importance in developing economies, but are not as widely used due to actors deciding to act outside the markets.

According to Krueger et al. (1988) nation-wide economic policies tend to have a greater impact on micro-level incentives compared to policies driven by decentralised politics on a micro-level. Yet, historically problems with corruption related to the

macroeconomic management of these policies have been evident in developing countries argues Barrett (2007). Concerns about corruption and market failures on a national level have encouraged decentralised management in developing countries. However the shift towards a decentralised community-based allocation of resources has exposed the equivalent of market failures; community failures, to be evident and often as severe as market-failures.

2.3.5 The agricultural sector

One large hinder to increase welfare for people living in poor rural areas is the improvement of the agricultural sector. The cultivation yield (i.e. output per cultivation area unit) needs to be increased in order to increase food availability, which is required to reduce hunger. Market failures cause difficulties for the yield to increase, such as shadow pricing and non-optimal distributions of inputs, which in its turn leads to problems, e.g. uneven returns.

Market failures in developing economies cause different returns from production for different households and farmer villages. When several markets fail (e.g. labour market, good market, etc.) shadow pricing (i.e. estimated prices for goods or services without market pricing) will occur for households and production communities, causing variations in incomes for the same amount of input. This is problematic since it will make returns uneven for farmers performing the same amount of work. One reason why this phenomenon often occurs in developing economies is imperfect information flows. (Barrett, 2007)

Imperfect markets also create non-optimal distributions which affect how land, labour and other inputs are used to produce, according to Barrett (2007). The farmers in imperfect agricultural markets generally have three choices to make:

- They can choose to be a part of the market and accept the costs, benefits, and shadow prices.
- They can choose not to be a part of the market and instead produce completely self-sufficient by themselves or in communities.
- They can choose to make agreements and contracts directly with a counterparty instead of participating in the autonomous market transactions. However, these contracts and agreements might be both complex and risky, partly due to a lack of legal implications of breaking an agreement.

However, there are solutions to the non-optimal solutions caused by poor information access amongst farmers. For example, a positive correlation between the yield of production and farm size could be derived from some observed cases. This discovery suggests that reforms to redistribute land, by increasing farm sizes, might generate both higher efficiency and higher yields. (Barrett, 2007)

2.3.6 Subsidisation of labour

One matter discussed frequently in development economics addresses appropriate ways of subsidising labour within agriculture, in order to maximise the positive effects of invested capital in welfare. In societies where a large proportion of the poor people rely on earnings of the labour market, policy decisions affecting wages and employment levels will have large impacts on the welfare. But in some cases, wages and employment levels also depend on the supply of labour which is a result of every household's choice, i.e there is often a latent labour supply that is not in use. For example, self-employed farmers or petty manufacturers. In these scenarios, if policymakers try to subsidise the labour market to increase wages, it is likely that the labour supply will increase causing the employment levels to rise but wages to stay constant. An issue for donors or policymakers trying to target malnourished groups of people with subsidies is that farmers due to long working hours instead uses the extra income to increase leisure time instead of increasing food production and thereby food intake. Investigating the behaviour of labour supply is central in order to increase the efficiency of grants and subsidies. (Barrett, 2007)

3

Methodology

This chapter presents the best fitting choice of method approach to reach the purpose of the study. Moreover, the data collection regarding the field study as well as the literature study will be further discussed. Finally, the ethical considerations related to the chosen method and method discussion is presented.

3.1 Method approach

For this report, an inductive approach is the most favourable way of gathering and analysing data. This is due to the qualitative characteristics of the research approach and to the fact that the writers have a weak base of knowledge within the area. According to Wallén (1996), these are criteria that make an inductive methodology appropriate. An inductive study is carried out by identifying patterns out of observations and then develop explanations and hypothesis about those patterns, informs Bernard (2011).

Wallén (1996) emphasises the importance of trying to have an unconditional approach to the empiric phase when performing inductive research. The reason for this is mainly that the collected material from the empiric should generate the chosen literature and theoretic framework without preconceptions, paradigms and personal values (Wallén, 1996). The first part of the study was therefore to gather overall knowledge about the area, which was then followed by a field study. The information gathered from the field study primarily came from qualitative interviews with supplements from document collection. The empiric patterns acquired from the data collection phase was then used to select appropriate literature to create a theoretic framework and to explain the patterns observed.

3.2 Field study

By conducting qualitative research, it is assumed that a holistic view, and seeing the whole picture in its entirety, is favourable compared to aggregating separate parts of the phenomenon. A field study is therefore preferable compared to solely literature studies since the purpose is, among else, highly connected to a certain social field. The direction of field studies are generally not fixed when initiated, they need to be

able to tackle problems that arise in the early stage of the process. Therefore, the strategy for conducting the study have to be flexible and open for new information obtained during the field study. (Mikkelsen, 2005)

Field studies differ from other studies, that are not conducted on site. There are biases that have to be taken into consideration as these can have an effect on the outcome of the study. Cultural norms, codes and foreign languages have to be interpreted in an objective manner, suggests Mikkelsen (2005). Here, Patton (2002) provides guidance that has been of importance in this field study. It is fundamental to take notes and reflecting over experiences during the field study. Focusing on quotes when reporting results is a good way to keep the own words of the interview object's experiences and to maintain objectiveness so that information does not get altered or get subject to biases of the ones conducting the study.

As this study lies within a social field, seeking answers outside of what solely literature studies can provide, a field study was carried out during three weeks by three of the group members which were based in Lilongwe, Malawi. Two additional members were supposed to join the field study for five weeks but had to stay home due to the circumstances regarding COVID-19. To make sure that the field study was performed according to the recommendations of Mikkelsen (2005) and Patton (2002), a few measures were taken. First of all, the design of the study was flexible and sensitive to new information that emerged before, during and after the field study was initiated. This allowed the research questions and the scope of the study to change throughout the entire study, which was a necessity in order to take the writers limited insights into the problems into consideration. Secondly, the various biases that may have arisen during this field study have been taken into account when conducting the interviews, explained further in section 2.2.1. Lastly, documentation and reflection have been a part of the entire field study by for example diary writing and reflection seminars among the writers.

3.2.1 Interviews during the field study

Key persons with favourable knowledge, such as an extensive worker, an organiser of sunflower distribution and a banking specialist with experience from the sunflower value chain, were initially interviewed in order to formulate basic assumptions of what major issues farmers are facing when transitioning from tobacco to sunflower production. The interviews have been the main data collection for this report, which has placed high demands on it being carried out correctly. Though this information is of great value, it is necessary to highlight that the insights collected from these interviews could be biased due to the interviewees' personal interests and lack of holistic perspectives. The interviews are therefore complemented with literature dealing the same area.

3.2.1.1 Selection of interview subjects

Regarding the selection of interview subjects, the group was supported by the aforementioned Fredrik von Homeyer and his contact network in Malawi. A number of cri-

teria are often considered to ensure trustworthy and qualitative content. According to Elo et al. (2014) these are credibility, dependability, conformability, transferability, and authenticity. Together with von Homeyer interview objects were chosen with regards to the above mentioned criteria. Contrarily, Trost (2010) argues that there is a disadvantage in letting a few people recommend the interview subjects. This is, for example, that these people steer the sample in a certain direction. Therefore, the snowball method concluded in Naderifar et al. (2017) was also used to diversify the selection, which is a technique where new interview prospects are recruited through current interview objects.

3.2.1.2 Structure of interviews

Since the study is inductive, unstructured interviews were conducted to give a better overall picture of agriculture in Malawi. This helped with avoiding a common problem which is that data collection is carried out before there is a clear purpose for the collection. When a clear purpose for the collection could be determined, semi-structured interviews with farmers were conducted, to further understand what challenges they face when switching between selected crops. (Wallén, 1996)

3.2.1.3 Conducting the interviews

The prevailing conditions in Malawi meant that the study was limited to physical interviews only. Physical interviews have the disadvantage that it takes more time, but one advantage is that the interviews become more personal and it is easier to recognise body language. During the interviews, one group member was responsible for taking notes and one had primary responsibility for leading the interview. The group chose not to record interviews because respondents are more likely to angle their answers to their own advantage and do not want to talk about sensitive questions when they are recorded. (Opdenakker, 2006) (Jacobsen, 1993)

During the time in Malawi, a total of seven interviews were conducted, three of them with key people and four of them with farmers who recently has increased their sunflower cultivation. The collected amount of data is not enough to solely be used as data to find empirical patterns. Below is a list of people interviewed and their professions:

Chikondi Khonje	Organiser of sunflower distribution
Patrik Uka	Banking specialist with focus on the agricultural sector
Steven Chimera	Extensive worker
Focus group	Four sunflower farmers

3.2.2 Method limitations

The original plan was to conduct the field study for 8 weeks. However, as mentioned, during the first three weeks on site in Malawi, the ongoing COVID-19 pandemic got a worldwide spread. Many international airlines started to cancel flights and many countries closed their borders to non-citizens. Due to these uncertainties in

the world, the people conducting the field study was forced to be evacuated to Sweden. Consequently, the field study in Malawi only lasted for three weeks and the implications for this is further described in the section regarding the field study's implementation.

3.3 Literature study

After identifying five challenges for transitioning from tobacco to sunflower production from the interviews, relevant theory was needed in order to be able to analyse these challenges and find possible solutions to them. This was done by a literature study, which had two main aims. The first aim was to find literature which could describe the basic economic theories relevant to the identified challenges. The latter aim was to find literature about specific cases where similar challenges have been dealt with previously.

In order to describe the general economic theories, the literature was found by looking back at previous courses in the Industrial Engineering and Management programme, where material from the course books *Vår ekonomi* by Eklund (2013) and *Industrial Innovation Economics and Intellectual Property* by Granstrand (2016) were found to be relevant to this report. The part about development economics was mainly supported by the article *Development Economics: An Overview* by Barrett (2007).

The literature about the cases mainly consists of scientific articles which were found by searching in Google Scholar and the database of Chalmers' library with search terms from the five challenges. As the literature study was conducted for several challenges, each representing wide subject areas, it was not possible to go through all the relevant literature for the respective areas with respect to the time limits for this thesis. It is a clear limitation that relevant literature may have been missed because of this. Therefore, the literature study should not be regarded as comprehensive for the challenges' subject areas, but rather as a selection of relevant literature.

3.4 Ethical considerations

There are four major ethical issues when conducting research: informed consent, beneficence/do not harm, respect for anonymity and confidentiality and respect for privacy. These principles are important to keep in mind in order to secure quality and avoid exploitation of the research objects. (Fouka and Mantzorou, 2011)

As data is going to be collected from individuals both in their professional and their private role, it is important to assure that these individuals are aware of how the data is going to be used. An active consent from the individuals by their free will is a must before the data is collected.

The principle of beneficence is important to keep in mind when working with data

that might be industrial secrets. If the data is released to the public or used in the wrong way, it might cause great harm to a company or an individual. It is therefore again crucial to inform about how the collected data is going to be used and get a consent for this.

Respect for anonymity and confidentiality can be supported by always having a dialogue with the source of the data about how the data is going to be used. If the source has any demands regarding the use of their insights, these potential demands will be respected. However, these demands will also need to be considered as they might delimit the project and thereafter decide if the data is of any relevance.

Respect for privacy is going to be asserted by always considering this ethical principle before releasing any data to the public. It is always better not to publish if there exists any contingency. Again, this issue is best handled by having a good dialogue with the data source.

Considering potential legal requirements for all these ethical issues is something that is going to be an important part in the work of developing the method for the project.

3.5 Method discussion

The method choices for the data collection were made based on the qualitative data needed to achieve the purpose of the study. As there was limited access to information about the study area to be investigated, the report was theoretically benefited from being conducted with an inductive and exploratory approach. However, this means that the information obtained through the field study may have influenced both the design of the report as well as its objectivity. This is due to the fact that some challenges appeared to be more significant than others, depending on the interview subjects selected in the early phase of interviewing, which is a factor that probably influenced how this report progressed. Further, it may be assumed that if other interview subjects would have been selected in the early stages of the report, the report might have dealt with other challenges than those discovered in this field study. This dilemma is difficult to overcome due to the fact that it is nearly impossible to encounter all kinds of challenges during a time-limited field study. The report has therefore sought to evaluate the challenges by weighing them against each other. The challenges have also, as far as possible, been supported with literature studies in order to find those that best represent the situation that local farmers experience, and what factors prevent them from permanently switching crops from tobacco to sunflowers.

Another aspect that was affected by our method approach is that the theoretical framework and the literature were selected based on information obtained through the field study, according to how an inductive approach should be conducted. A problem that arises as a result of this is that the literature may have been unknowingly selected subjectively to substantiate the claims made by the study's interview

subjects. This can make the challenges seem more severe and widespread than they actually are, due to that they might have been reinforced partly by the authors of this report and partly by the literature selected. This problem might also be augmented by the fact that a field study was conducted in which the challenges have been witnessed by the authors themselves, which could have made the problems more subjective. Furthermore, literature might have been selected based on the report authors' own preferences, which may have steered the report in a certain direction. It is difficult to approach these problems with a completely unconditional attitude. To minimise this problem, all interviews have been recorded and transcribed, enhancing transparency as well as enabling an objective discussion of the challenges in retrospect.

Against the background that some data collection may be subject to biases, the report has consistently focused on evaluating and comparing the challenges, and trying to approach the task with objectivity. There has throughout the entire report writing been an understanding that the challenges and solutions identified are contextual and influenced by unique and local factors. Nevertheless, it should be pointed out that the challenges have been identified through a qualitative field study, which is an examination of local problems experienced by the interview subjects. There are certainly more problems, more or less significant for the switch between sunflowers and tobacco, that did not arise in this report's data collection. These might be discovered through other field studies conducted in other geographical areas, by interviewing other subjects. This is why the results of the report should not be generalised to similar problems in other contexts.

In general, the method choices that were made led to a well-functioning workflow and satisfactory results for the research questions of this report. Conducting unstructured and informal interviews in the early phase of the study was well suited in order to get familiar with the challenges and identifying potential interview subjects for the semi-structured interviews. More time with each interview subject as well as more people to interview could have given more nuance to the report, but the experience was that time, in the end, was not a limiting factor.

4

Case studies

This chapter will present a few case studies closely related to the challenges described in the next chapter, which will contribute to the analysis of and to form possible solutions to the challenges. First, two cases about agricultural subsidisation will be presented. Then follows cases about the education-focused company Malawi Mangoes and one about how the technology blockchain could be a way to strengthen property rights. Finally, cases about both the current challenges and potential solutions to gender inequality in Africa are presented.

4.1 Subsidisation related to agriculture

Subsidisation is common for overriding cooperation to deal with market failures. This section describes the effects of two cases where subsidies have been used.

4.1.1 Subsidisation effectiveness

The effects of maize fertiliser subsidisation in Malawi are examined. The authors believe that policymakers often assume that those who receive subsidised fertiliser will achieve the same yield responses as the farmers who pay commercial prices for their input as the policymakers thus assume they would get equal opportunities. However, the results of the study show that those who pay commercial prices obtain higher yields per kilogram of fertiliser than the ones using the subsidised fertiliser. This shows that other factors also have an effect on the yield. Nonetheless, it appears that those who have not previously used fertilisers or used very little achieve a much higher yield response. This proves that in order to get effective subsidy programmes, the government should subsidise fertiliser to those who lack access to commercial markets or otherwise do not use fertilisers. (Ricker-Gilbert et al., 2009)

4.1.2 Subsidisation of hybrid maize in Malawi

Audet-Bélanger et al. (2015) have conducted a study regarding the governmental subsidy system in the agricultural sector. The study focuses on the subsidies of hybrid maize, which is improved maize germplasm. The study was carried out in Lilongwe, Malawi and the objective were to see how earmarked subsidies of a specific crop affected the total agricultural sector as a whole. The subsidy of the crop started

2005 by the Farm and Input Subsidy Programme (FISP) and since then the number of hybrid maize producers that have entered the Malawian market has grown from one to 24 between 2005 and 2015. According to the study, this growth is due to the subsidies in combination with a governmental promotion of the seed. The authors conclude that this growth would have been impossible without FISP since companies report that the subsidy represents 50-60 percent of their total revenue.

However, even though the market for the hybrid maize has grown, the total profit for the producers has not grown significantly. The authors conclude that a reduction of subsidies from FISP would lead to a hard time, especially for the small companies, to compete and engage on the market since the governmental support contributes to a lower sales price for these companies. (Audet-Bélanger et al., 2015)

4.2 Malawi Mangoes

In an interview made by Farming First Jacobs (2015), Jonathan Jacobs (2015), who is the CEO of a company called Malawi Mangoes, tells his story of the company and its success factors. Malawi Mangoes is a Malawian based company that started 2009 from the realisation of the potential of the country (Devex, 2019). Jacobs (2015) explains that the reason why they started the production is because of the unused soil, which is a result of Malawi being one of the most underdeveloped countries. He proposed that the company can grow things at a competitive price and produce a competitive product, which would be beneficial not only due to new employment opportunities but also from a macro perspective, allowing the country and individual smallholder farmers to export their products.

One thing that makes Malawi Mangoes unique is its way to include new local farmers. The company took 500 acres of land and split that up in pieces of half an acre each and then invited smallholders to cultivate mangoes on their land. Their concept is then as follows. During a year, the farmers get the opportunity to grow crops and learn from the company but still keep the yield. Malawi Mangoes help the farmers to find a market by acting as their agent on the fresh market, and at the same time the farmers get to keep the profit for themselves. After a year the farmers go back to their villages with new competences and can continue to grow crops more efficiently. Malawi Mangoes then offers to buy the crops cultivated by the educated farmers since they now know that the crops are of high quality. (Jacobs, 2015)

4.3 Gender inequality in Sub-Saharan African countries

Women UN (2019) refers to women in Sub-Saharan African countries as the *"backbone of African rural agriculture and the guardians of the continent's food security"* and states that women approximately represent 80 percent of the continent's agricultural workforce. Likewise, Food and Agriculture Organization of the United Nations

(2010) addresses the women's faceted and pivotal role in society by acting as farmers, workers, and entrepreneurs simultaneously. This is further highlighted by Africa economic brief (2019) when they describe that women have all these roles and at the same time are expected to take the responsibility of managing the household and carry out all its related chores. The main issue on this matter, which Africa economic brief (2019), Women UN (2019), Food and Agriculture Organization of the United Nations (2010), and Gender equity and rural employment division of FAO (2011) all accentuates, is that women, especially within agriculture and living in rural areas, are discriminated in many different ways. Food and Agriculture Organization of the United Nations (2010) mentions that women generally have less access to productive resources and opportunities such as land, labour, education, extension services, and financial services.

The land discrimination towards women is further specified as smaller land size, unequal land tenure systems, and property rights, according to Africa economic brief (2019). Africa economic brief (2019) continues by raising gender inequality when it comes to women's limited access to advisory and extension services, the exclusion from credit and financial markets as well as having a lower rate of modern inputs application, such as chemical fertiliser, pesticides, and improved seeds. Similarly, Gender equity and rural employment division of FAO (2011) complements by describing that women are disadvantaged when it comes to getting paid for their labour and in extension higher and more secure incomes in order to improve food security. The aspect of education relating to gender inequality is highlighted by Gender equity and rural employment division of FAO (2011) which states the illiteracy is common amongst rural women and addresses that a consequence of this is that these women have poorer employment prospects. In addition, women are often ignored in projects focusing on development in the agriculture sector, informs Women UN (2019).

Gender equity and rural employment division of FAO (2011) draws a conclusion of how discrimination and constraints, in this case women's lack of financial resources and land, are hindering the women from growing cash crops since they cannot buy the required inputs. This, in turn, leads to that the women cannot generate the funds necessary to prevail credit and loans which would give them further possibilities, suggests Gender equity and rural employment division of FAO (2011). Correspondingly, Women UN (2019) says that gender inequality prohibits productivity and achievement of the social development goals.

Both Women UN (2019), as well as Food and Agriculture Organization of the United Nations (2010), emphasise the importance of changing Sub-Saharan countries' policies regarding gender equality to be more gender-aware for the women to have a chance to catch up with male farmers. According to Food and Agriculture Organization of the United Nations (2010), a gender-neutral policy is not enough for women to overcome the current constrain, both donors and governmental institutions play an important role in this work. By promoting gender equality, the productive potential women have can be utilised which will yield an overall better result regarding

a country's total efficiency by increasing agricultural productivity, reducing hunger and poverty as well as advocate economic growth.

The main focus should be on giving the women an opportunity to equal access to resources. As of today, women do not have the same possibility of owning land, giving them a disadvantage. By giving them the same property rights, women could be a part of the decision-making of what crop to cultivate, when to sell, to who as well as financial decisions. Since the average years put into education is substantially lower compared to men, the potential effect of improving women's access to an education of higher quality becomes important. Higher educated women would enable them to not only improve their future opportunities, but also enable them to participate in extension services as which in its turn would help them access the credit, finance, and insurance market. (Africa economic brief, 2019)

4.4 Overcoming gender inequality amongst Nigerian smallholders

An article by Ogunlela and Mukhtar (2019) describes how two different organisations have worked with overcoming the gender inequality amongst the Nigerian smallholders.

Women Farmer's Advancement Network (WOFAN) was founded in the early 1990s and aims to mobilise and train rural women in the management of information and communication. The main focus of the organisation is to act as a forum where farmer women can exchange their everyday experiences, learn about modern farming techniques, and also gain access to credits and insurance. (Ogunlela and Mukhtar, 2019)

Another initiative is Women-in-Agriculture (WIA), which started in 1988 and aimed to integrate women into the agricultural development processes. This as a response to previous agricultural extension systems that were neglecting women's needs. The programme aims to ensure that extension services would have females at every level of operation and also give access to credits and farm inputs. The results of the WIA programme has been improved food security and supply, empowering women to be part of the decision-making process, and increased income-earning capabilities for female farmers. However, the effects were limited due to e.g. a low ratio of extension workers that could support farm families. (Ogunlela and Mukhtar, 2019)

Concluding the article are some recommendations for future work with gender issues in Nigerian agriculture. The importance of women's role in agriculture needs to be demonstrated and included in national statistics, e.g. by counting work at home as employment, in order to improve the decision-making about agriculture and thus develop agriculture in general. Empowering women to participate in agricultural decision-making is one of the most effective ways to demonstrate this importance. Furthermore, feedback channels with all parties in the agricultural development and

support systems within a gender-sensitive framework are also contributing to the agricultural development. (Ogunlela and Mukhtar, 2019)

4.5 Blockchain technology as a way to strengthen land titles

The World Bank describes clear property rights as one of the most important institutions for facilitating economic development. A report by The Organisation for Economic Co-operation and Development (OECD) describes two cases of how the new technology *blockchain* could be a way to strengthen land titles, one of the most elementary property rights. (Eder, 2019)

Previously, blockchain has been used for creating tradeable tokens and cryptocurrencies, which has made blockchain into an excellent technology for improving traceability, transparency, and governance. It allows users and observers to understand and legitimise transfers as well as facilitates the transferability of a unit. However, blockchain is not a solution to all problems. There are still risks that the original information is being distorted for dishonest purposes before being put into the blockchain system and thus traceability risks could remain in the system. (Eder, 2019)

An initiative in 2018 by the Ghanaian Ministry of Lands and Natural Resources and IBM aimed to put Ghana's land titles on blockchain, which has also been preceded by smaller similar initiatives. 80 percent of land titles in Ghana lack sufficient documentation, which is increasing risks for expropriation and fraud. There are also many bureaucratic difficulties present when registering property. However, Ghanaian authorities have been hesitating to support the implementation of this initiative and especially to adapt the legislation to blockchain. Consequently, few results have been seen yet. (Eder, 2019)

In 2016, Georgia's National Agency of Public Registry started to implement blockchain in their organisation together with the blockchain company Bitfury. Two years later, 1.5 million land titles were registered in the blockchain system. Contributing factors to this success are e.g. tax exemptions on blockchain mining and public discourses on the topic. Furthermore, this initiative has been a part of a broad anti-corruption initiative from the government. (Eder, 2019)

Comparing the cases of Ghana and Georgia shows that a broad engagement from different stakeholders is key for a successful implementation of blockchain-based land titles, which can then give significant strengthening of property rights. Moreover, the implementation must be part of a bigger strategy with education and tax incentives supporting the implementation. (Eder, 2019)

5

Results of field study

This chapter will present the results from the data that have been collected in this study, compiled into five main challenges regarding the transition from tobacco to sunflower cultivation in Malawi. The chapter begins with background information gathered from the interview subjects. The challenges, but also in some cases solutions proposed by interview-objects have been identified from both the unstructured and semi-structured interviews conducted during the field study.

5.1 Background information from field study

This section will shortly highlight important information, from the interview subjects' point of view, that is needed to understand the current agricultural situation in Malawi.

5.1.1 Sunflower cultivation in Malawi

Chikonde Khonje (personal communication, 6 March 2020), an organiser of sunflower distribution in Malawi is working to promote an increase of sunflower cultivation in Malawi. Khonje informs that a concept she uses is to sign contracts with sunflower farmers. The contracts state that the farmer will be supplied with a given amount of sunflower seeds at the beginning of the cultivation period. Farmers are then able to sell the fully grown sunflowers to the seed supplier for a given price per kilogram. Since Malawi has a greater demand for sunflower seeds than the country can supply, more seeds are imported and stored in warehouses, mainly from Zambia. The seeds are processed into unrefined sunflower oil, which is used to feed animals. The seeds can be further processed into refined sunflower oil, which is sold as cooking oil.

Khonje (personal communication, 6 March 2020) explains further that there are inherent differences amongst crops regarding which ones thrive in what climates. She claims that the sunflower only gets one single harvest per year, due to a shortage of water supply in large parts of the country during the dry season. However, the same does not apply to maize and tobacco that can be grown throughout the entire year without additional irrigation efforts. Even though Malawi is landlocked, the country's geographical position alongside Lake Malawi means that there is existing

access to water reserves in the areas around the lake. Therefore there is a big potential in creating irrigation systems that can be used during the dry period to enable sunflower cultivation all year round.

5.1.2 Farming cooperatives

The field study also highlighted the farmers' current situation by conducting a focus group interview with sunflower farmers. The focus group informs that most households consist of 5-10 people. Approximately half of those people contribute to the cultivation whereas the rest are young children. Similar to what Khonje mentioned, the focus group explains that very few farmers focus solely on a single crop during one season. The vast majority of the harvest is sold to earn money, whereas the remaining yield is kept within the households for eating. To increase their overall efficiency, small cooperatives have been formed. The number of members in each cooperative ranges between 25-30 people, which makes it beneficial for co-ownership of equipment as well as the distribution of labour and knowledge-sharing. These groups also cooperate regarding financial issues. By offering an accumulated future yield, the risks for the banks are lower and in extension, this lowers the interest rates for the farmers. Most farmers own around one acre of land. To increase their returns, more land is leased from landowners. (Personal communication, 10 March 2020)

5.1.3 Agricultural cycles in Malawi

Agriculture in Malawi is highly seasonal, and as it constitutes a large part of the Malawian economy, the economy is also dependent on these cycles. The rain period from October until March is followed by the harvest period from April until July. From July to October there is a dry period, explains Patrick Uka (personal communication, 3 March 2020). The focus group of farmers (personal communication, 10 March 2020) informs that they have a hard time finding work and income during the dry season. They have to stash the crops from the rain period to survive during the dry season, sometimes they can lend small irrigated soil areas where vegetables could be grown. The size of the soils are too small for a potential sunflower or tobacco cultivation to be profitable. The vegetables are often not as profitable as other crops and are primarily used for own food consumption.

5.2 Challenges with a transition to sunflower cultivation

This section will consist of the challenges identified from the interviews regarding the transition from tobacco to sunflower cultivation in Malawi. Furthermore, a few solutions to these challenges, proposed by the interview subjects are mentioned in this section. The challenges that are being highlighted in this section are the following:

- *The farmers' short-term economic incentives*

- *Limited financial resources*
- *Gender inequality*
- *Education and information*
- *Corruption and deficient governmental institutions*

5.2.1 The farmers' short-term economic incentives

Khonje (personal communication, 6 March 2020) describes that farmers are highly driven by short-term economic incentives, resulting in problems regarding establishing sustainable relations and long term agricultural development. If a higher price per kilogram of sunflowers than the one stated in the purchase contract is offered to a farmer by another purchaser, it is likely that the initial contract and thus the initial purchaser is abandoned. Steven Chimera (personal communication, 10 March 2020), a farmer coordinator, claims that purchasing contracts often have a strict agreement of exclusive rights for the buyer. Yet, new offers from other purchasers are often accepted regardless of whether the other terms may be more favourable for the farmer in other aspects. Other terms could, in this case, consist of long-term safety in seed supply and purchases of harvested sunflowers in the future or better logistic alternatives for the farmer, e.g. cheaper transports. Fredrik Von Homeyer (personal communication 19 February 2020) explains how he tries to increase the farmers' incentives to preserve their initial agreements. He is establishing closer relations with the farmers by e.g. offering free seeds that the farmers can cultivate and, in the off-season, offer an opportunity for the farmers to process their seeds into unrefined oil.

The fact that the short-term economic incentives are strong amongst the farmers makes it hard to establish sustainable long-term relations between the farmer and a buyer or an intermediary actor in the value chain. Khonje (personal communication, 6 March 2020) explains that her ambition is to help the farmers develop their way of working, through education in agricultural practices as well as providing insights about the benefits with long-term purchasing contracts, which is hindered by the short-term economic incentives. According to Khonje, the return on investment for a farmer is generally higher for tobacco than for sunflowers, which could result in that farmers with short-term economic incentives to a greater extent choose to cultivate tobacco rather than sunflowers.

Another aspect highlighted by the farmers in the focus group (personal communication, 10 March 2020) is that the market for sunflowers is a long distance from the farming cooperatives where most farmers live, and where the actual cultivation takes place, which results in transportation costs. One woman in the focus group suggested that this could be solved through the coordination of transports between the cultivation communities in the village, but also between different villages. Although there are possible cost savings to be made through coordination of transport,

the woman explains, an obstacle to these sorts of implementations is trust issues between farmers themselves and between farmers and external actors. Farmers do not want to give away their sunflower seeds without knowing what amount they are going to receive in return. Previously, farmers who have trusted external actors have been cheated, given a lower price for their yield. Since they did not attend the market themselves, they cannot prove that they have sold their crops to an unfair price.

Chimera (personal communication, 10 March 2020) explains that Malawians have historically grown tobacco and see this as the most lucrative crop. Farmers are also highly influenced by what crops neighboring farmers cultivate in their choice of crops. This creates an obstacle in switching to sunflower cultivation, although the sunflower, in the long run, might be more economically sufficient from a total cost perspective. When cultivating tobacco, farmers can reuse plants to cultivate new crops. This creates another hurdle in switching to sunflower cultivation, as sunflower seeds are needed to cultivate sunflowers which creates significant initial costs. Uka (personal communication, 3 March 2020) further explains that the tobacco has an established and formal market due to the strong history of tobacco trade.

The market for other seeds such as sunflower is not as well structured and more informal which obstructs the expansion of sunflower production. Uka (personal communication, 3 March 2020) also states that foreign loans are very beneficial for Malawian farmers as the interests of these loans are lower. However, they are only accessible to farmers in the export sector. This leads to increased incentives for farmers to export their products, which in the short term can have economic benefits. In the long run, this causes a loss of production for Malawi due to lost job opportunities in the refining process of the crop. This motivates tobacco cultivation since it is a crop that is highly exportable, further obstructing a shift to sunflower cultivation.

Uka (personal communication, 3 March 2020) mentions the government organisation, *Agricultural Development and Marketing Corporation* (ADMARC), whose purpose is to buy crops from Malawian farmers and sell them to foreign as well as domestic producers of agricultural products. Uka states that it could be positive for the farmers to sell and build relationships with ADMARC since they often pay more than private companies. The problem with ADMARC is that the organisation is too slow to reach the market. When it receives financial resources from the government, the farmers have often already sold their goods to private companies. If the organisation had become more agile, it could potentially be a better long term economic option for the Malawian farmers.

5.2.2 Limited financial resources

This section highlights challenges that are rooted in limited financial resources, which are connected to the fact that investments in irrigation and power being too large. Lack of trust between financial institutions and farmers is another financial

hinder resulting in reduced possibilities of acquiring loans.

Malawi's position alongside Lake Malawi means that the country has access to water, therefore there are possibilities to expand the cultivation of sunflowers by enabling all the farmers throughout the country to access the water. This is done by implementing irrigation systems. However, the cheapest irrigation system has an installation cost of about 1 million Malawian Kwacha, or USD 1 350, which is unaffordable for most farmers, states Uka (personal communication, 3 March 2020).

As a extensive worker Chimera (personal communication, 10 March 2020) confirms that very few sunflower farmers cultivate during the dry season if their farms are not close to Lake Malawi, due to insufficient water resources. He continues by explaining that in his farmer village the community itself first saved up and invested in two irrigation pumps, and the non-governmental organisation *World Vision* gave them six more. This is the main reason his village can cultivate sunflowers all year round. According to Uka (personal communication, 3 March 2020), one of the benefits of having irrigation systems in place is that it is lowering the risks for banks due to the higher probability of the farmers getting successful harvests. As a consequence, irrigation systems in place could give farmers lower interest rates.

As an example of reducing this risk, the Swedish company Grundfos used new technology in irrigation systems. They were putting chips in the systems to enable the gathering of data, which could be used to make agriculture more effective by analysing the data. Furthermore, these chips were used as a tool for the banks, who had financed the systems, to monitor the farmers and also be able to shut down the systems in case the farmers would not follow signed agreements. This is used as a security for the banks, which is lowering the interest rates for the farmers, informs Uka (personal communication, 3 March 2020).

Furthermore, power is needed for these irrigation systems, claims Uka (personal communication, 3 March 2020). As Malawi is dependent on hydroelectric power, power is present when it is raining but is insufficient during the dry period. Therefore, there is a big potential in increasing solar power in Malawi. The use of solar power is currently increasing in Malawi and could be a power source for irrigation systems, but the initial cost is a barrier for adopting solar power. Irrigation systems could also be a solution to the problem with the drought in Malawi as it would enable several harvests throughout the year.

Even if the farmers could afford the initial investment of their own irrigation systems, there is another issue says Khonje (personal communication, 6 March 2020). A major challenge is that a vast majority of the country's water pipes lie near Lake Malawi, making it very hard for crops to survive during the dry season in other parts of Malawi, more remote from the lake. This problem can not be solved by farmers or local communities themselves, it is rather a question for the government. This is an infrastructural problem that hinders the development of large-scale agriculture and full resource utilisation of arable land that is an issue related to limited financial

resources on a governmental level.

Uka (personal communication, 3 March 2020) states one measure that has been implemented by the government which is facilitating for farmers to create cooperatives to commercialise farming. This could help some farmers to monetise their production instead of only using it for own consumption. This is done, not only through financial support but also by advising and educating farmers. There are two ministries dealing with farmers. The Ministry of Agriculture operates at a district level. Through district offices, they are giving extension services in order to educate farmers on agriculture. An agribusiness officer, who helps the farmers businesses, recommends the farmers to organise in groups and to form cooperatives. The ministry of trade is responsible to provide farmers with a certificate for cooperatives. In the whole country, many farmers now form cooperatives. Cooperatives also seem to strengthen the work discipline amongst the farmers.

Chimera (personal communication, 10 March 2020) reports that as an extension coordinator he coordinates 1200 farmers and amongst these, there are cooperatives of about 25-30 farmers. These cooperatives often collect their economical surpluses locally and accumulate them in a joint reserve. As it is very hard for an individual farmer to get a loan from the bank, the farmers in the cooperatives can loan capital from this reserve at an interest rate of 20-40 percent. This rate is very similar to what the banks are offering. The interest differs amongst the groups and the interest cost is split every six months between the farmers in a cooperative. In this way, the money stays within the communities of cooperatives, i.e. the villages, in a closed circle. Uka (personal communication, 3 March 2020) also emphasises the importance of accumulating risks amongst several farmers to make them more eligible for bank loans. Uka works with *Commercial Agricultural Support Services* (CASS), an actor from the private sector working with commercialising farming and bridging the gap between farmers and financial institutions. One big risk for banks is climate risks, such as floods or droughts. CASS is making a guaranteed fund for these risks, sharing the risk between the bank, farmers, and themselves. The banks pay ear-marked money to e.g. farming equipment or machines, in this way assuring that the money is not wrongly distributed.

5.2.3 Gender inequality

A widespread problem in local farming communities is that women are solely taking responsibility for the processes of planting, managing, and harvesting the crops. A reason for this is that men abandon their families when the cultivation period approaches and thereby leaving the women alone with taking care of children, the household, and the farming. Khonje (personal communication, 6 March 2020) emphasises the difficulty to cope with all these tasks simultaneously and explains that it has negative effects on agriculture. The loss of the men's workforce also results in difficulties to finance the crucial fertiliser. Khonje states that this is more widespread in communities where the sunflowers are cultivated, as these are predominantly smallholder farmers compared to tobacco farms which are often more

developed and commercialised.

Khonje (personal communication, 6 March 2020) accentuates that the gender-unequal culture in Malawi is established from a very young age, the male children are sent to school and become educated whilst the females are not given this possibility since they will most likely be subjected to arranged marriages. This inequality is further expressed in the agricultural field since the men are the ones having more access to the market and to purchasing fertiliser, seeds, machinery, and other necessary farming equipment. Khonje is exemplifying this by mentioning that when the government is distributing coupons to buy the above-mentioned equipment it goes through the village chiefs and local authorities and lastly reaching the men, as they function as the head of the family. Similarly, men are the ones taking responsibility for the loans and credit since they are the ones managing the savings as well as being educated and thereby having more collateral than the women. In contrast, women are restricted to carry out the physical labour that agriculture requires.

A solution to this inequality is suggested by Khonje (personal communication, 6 March 2020) as she says that *“once you educate a girl, you educate the whole nation”*. By this, Khonje means that in order to tackle this challenge a significant cultural change has to be made and especially by looking at the root cause, namely, that young female child is given limited possibilities of education which, in turn, has life long consequences. In addition, Khonje mentions that non-governmental organisations have realised this ongoing discrimination against women and therefore changed their way of managing initiatives. The non-governmental organisations are encouraging women, in many different sectors, especially in agriculture, to take on leadership roles and empowering them by giving the responsibility of handling the village savings and loans to the women instead of the men. Khonje implies that this act of empowerment is crucial to help the women gain access to the market as well as vital equipment to further facilitate an agricultural shift from tobacco to sunflower-cultivation.

5.2.4 Education and information

Khonje (personal communication, 6 March 2020) mentions that a majority of Malawians today are getting their food by farming it themselves or by being part of a trading economy in small communities, this means that they are not a part of the agricultural market and it is therefore rare that they receive information from channels other than within the local communities. Firstly, the farmers are not updated about demands, farming techniques, and risks as well as benefits of cultivating different crops. Furthermore, Malawian farmers are mainly dependent on their own production and they are not farming with the intention of selling the product. Finally, growing maize and tobacco lies within the Malawian culture. These three reasons are the foundation of why education and new information are needed in order to change behaviours and increasing the rate of transition to sunflower cultivation.

Chimera (personal communication, 10 March 2020) states that he himself has no formal education in farming despite having the role as an extension worker, meaning that he coordinates farmers and acts as a role model for farmers. Chimera means that it is a big problem that the ones coordinating the farmers do not have the knowledge or the tools necessary to do so. Furthermore, Chimera identifies a learning barrier in the switch from tobacco to sunflower cultivation. Farmers that grow tobacco realises the benefits with sunflowers but does not have the expertise or tools to switch to sunflower cultivation.

The dry period in Malawi results in a stand still in the agricultural sector, and as a consequence a big share of Malawians are unemployed. Some Malawians guest-work in South Africa during this period, resulting in loss of GDP and tax revenue. The government has tried distributing social funding to farmers and in exchange letting them e.g. maintain the infrastructure in their areas. However, this does not seem to work very well informs Uka (personal communication, 3 March 2020). Khonje (personal communication, 6 March 2020) believes that one solution to what problem regarding education and information could be to educate farmers, both in modern farming techniques and in the downsides of cultivating tobacco. This could be done by the government during the months of the dry season when farming is challenging and a lot of farmers otherwise are working in other countries. Using modern technology, it is possible to gather local farming communities and either digitally or physically, give them education about how they could improve their farming in terms of crop transition and how to use techniques and technology to cultivate the new crop.

5.2.5 Corruption and deficient governmental institutions

Many of the above mentioned problems related to a transition to sunflower cultivation in Malawi are rooted in deficient governmental institutions which partly is a result of corruption, according to Khonje (personal communication, 6 March 2020). The country's legislators and decision-makers are sometimes driven by other incentives than to do what is best for the country. This has several implications for the sunflower cultivation, one of them being the impact on investments. As Khonje is involved in a project trying to implement self-sufficient water pumps in Malawi, she has witnessed the problem herself. Khonje says that the government is providing insufficient support to her project and is demanding a lot of money for allowing large-scale sales of the pumps. Even if the project might create long-term benefits and tax income for the country and its people, these initiatives are not prioritised by the government. This might be a hinder for investment in startups and other forms of impact investing, for making a real change in Malawi. As water infrastructure, irrigation systems, and other techniques required for sunflower cultivation cannot be easily invested in by external stakeholders either due to e.g. deficient sharing of information and policies of ownership. This too is a challenge for the transition to sunflowers from other crops.

The current system of financial help for agriculture is to fund entire villages or cities,

which then is distributed to different projects and stakeholders by the village chief. This procedure is set for corruption, according to Khonje (personal communication, 6 March 2020). Instead, machines and farming systems should be subsidised for farmers in order to control who receives the money and for what purposes. This is just one example of a malfunctioning distribution of funds that does not reach the initial target and instead is distributed solely by the middlemen, in this case, village chiefs. Non-Governmental Organisations and private companies are distributing equipment, seeds and, fertilisers, but this aid only favors a small part of the initial target. To make sure that farmers are the group that benefits from these kinds of actions, more solutions as the one previously stated are needed.

Uka (personal communication, 3 March 2020) explains that there are foreign investors, mainly from Asia, exploring business opportunities within agriculture, banking, and tourism in Malawi, but these are often discouraged due to problems with corruption and bureaucracy within the Malawian government. This leads to a complex and time consuming company-registration process for these foreign investors. This has lead to companies only procuring raw products in Malawi and doing the processing in other countries. A consequence is that employment opportunities are created outside of Malawi since the processing is executed abroad. Von Homeyer (personal communication 19 February 2020) states that there are substantial business opportunities in Malawi. The high interest rates make establishing businesses very hard for Malawians without capital resources. This leads to competition being almost non-existent locally in Malawi. However, he accentuates that problems with corruption and bureaucracy hinder foreign businesses from establishing in Malawi. Importing machinery and other non-monetary resources becomes very problematic. Fredrik has tried to exclusively develop his business using local resources as he considers it to be far too problematic and costly to import the necessary resources.

6

Discussion

This chapter will discuss the results of the field study together with the theoretic framework. The aim is to analyse the challenges which prevent farmers from switching from tobacco to sunflower cultivation stated in section 5, and discuss appropriate solutions to these challenges. Finally, the report's impact on the United Nations Sustainability Goals is critically analysed for each challenge.

6.1 The farmers' short-term economic incentives

As farmers are highly driven by short-term economic incentives, obstacles arise preventing farmers from transitioning from tobacco to sunflower production. There are actions to be made, affecting both the supply and demand side of the market. One action, is to increase the production cost on tobacco combined with a decreasing production cost on sunflower, which could facilitate the transition from tobacco to sunflower cultivation. The latter could be concretised by subsidising sunflower seeds and the earlier by instituting taxes on tobacco. A consequence of subsidising sunflower production would be an increase in the supply since the marginal profit would increase, as seen in the left part of Figure 6.1. In contrast, taxation on tobacco production would affect the supply negatively since the marginal profit would decrease as a result of higher production costs, seen in the right part of Figure 6.1.

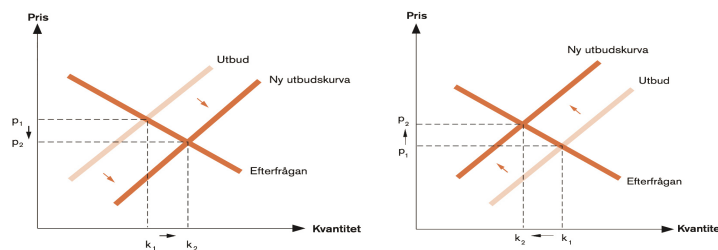


Figure 6.1: The left figure represents an increase of supply due to the subsidisation of sunflower production. The right figure represents a decrease in supply due to increased taxes on tobacco production. Retrieved from Eklund (2013)

As of today, a lot of negative externalities, in the form of environmental, economic, and social costs, are not weighed into the tobacco price which is an example of a market failure. Highly toxic chemicals together with strong fertilisers are poisoning the soil and the farmers themselves are also suffering from these externalities. The fact that farmers get ill is costly for the entire society in terms of medical care and in terms of lower food supply due to a lower number of farmers that can work with the cultivation of crops.

Apart from the negative externalities, the fact that most of the tobacco is exported from Malawi results in a loss of production and tax revenue for the country, since the native demand currently is higher than the supply. This also entails lost job opportunities attributable to the processing of the crops within the country, which in turn may cause both an economic and social loss. These factors should be taken into account when the tobacco is being sold.

However, regarding the sunflower it is the other way around. By cultivating sunflower, the product primarily stays inside the country. As opposed to tobacco, the cultivation process of sunflowers is not harmful to the same extent. Furthermore, the content of the sunflower seed is necessary for Malawian public health. If a higher level of sunflower would be included in the Malawian diet, the inhabitants could stay more healthy, due to a higher intake of protein and fat. This is one example of the positive externalities that are related to sunflower cultivation.

As a governmental measure to increase the farmer's incentives to cultivate sunflower by subsidising the seed production, a possible outcome of this could be a similar one as in the case study regarding hybrid maize. In the short term, the supply of sunflower would increase and the crop would be more profitable for the farmers. Though, in a longer term, the profit is solely based on the subsidisation, which means that if the subsidy would be curtailed the farmers would have a hard time competing and engaging on the market. Another possible outcome of subsidisation could be that it raises awareness of the sunflower cultivation's potential, making it so compelling that farmers even consider a transition from tobacco to sunflower. In this case, the short term incentives that justify the farmer's change of crop could be just as beneficial for the farmers in a long term perspective.

It is important to be clear of what part of the sunflower production that should be subsidised. For example, since Malawian farming households have a latent labour supply, it is according to development economics not the best solution to subsidise the labour if the target is to enhance the profits in production. Instead, the subsidisation could focus on e.g. number of produced units of sunflowers which will increase the production margins. The labour will not gain from higher production margins in the short run since it is likely that the temporarily higher profits are likely to accrue to the landowners, causing hunger problems to persist. Nonetheless, the result of higher margins in the agricultural production might get more farmers to switch to cultivating sunflowers in the long run. This would increase food supply which in its turn would increase labour and reduce hunger problems.

The budget for subsidising the agricultural sector should primarily come from a higher tax of tobacco cultivation. As the tobacco production tax is a major income for the government today, it is of high importance that the production is phased out gradually and not all at once. By increasing the tobacco tax in small steps, the tobacco production will decrease while the tax income could be constant. These tax increases could then finance the subsidisation of sunflower production, keeping the tax income from tobacco and the tax spending on sunflower at the same level. This would at the same time increase the incentives for the transition to sunflower cultivation. Looking at the positive effects of sunflower production relative to tobacco production, this can be argued to be an absolute necessity for solving some of the country's largest problems in the long term, which are partly caused by the uneven distribution of crop cultivation in the agricultural sector.

To conclude, if the positive externalities of the sunflower production, as well as the negative externalities of the tobacco production, would have to be internalised, it makes sense to take actions in order to increase the incentives for farmers to switch to sunflower cultivation. This could be done by subsidising the number of produced units of sunflowers, which would benefit the output of food produced in Malawi and decrease the effect of the negative externalities caused by tobacco cultivation. This action should be financed through a progressive tax increase on tobacco production. However, it is important to consider the possible negative outcomes of subsidisation. One of them is that the initiative does not contribute to the long term development, but instead ends up in a situation where the positive effects of the investment endure unless the government continues to finance the sunflower production.

6.2 Limited financial resources

The fundamental problem of limited financial resources amongst farmers plays a decisive role in their decision making. This problem creates challenges for farmers to transit to sunflower cultivation. In order to facilitate for this transition, actions can be made in areas such as irrigation systems, implementation and financing of new technology as well as risk management in farming cooperatives.

From an investment point of view, there are advantages in choosing tobacco prior to sunflower farming due to the fact that tobacco can be cultivated all year round while the sunflower requires irrigation during the dry season. This truly is an issue since irrigation systems are difficult to access and expensive, just like the oil presses used to extract the oil from the sunflowers. Both increasing the input in the farming process, e.g. hiring more farmers with longer working days or farming more on the same land area, as well as increasing technology efficiency, by utilising more of each worker or land area, appear to be unsustainable solutions in the long run. Instead, the output could be increased by improving technology. Enabling the usage of new technology for the farmers could be beneficial for the farmer's efficiency which in its turn would increase the profitability of sunflower farming in relation to tobacco farming. A problem mentioned in development economics is however that the producers rarely are the ones that benefit from new technology in the long run, as the enhanced

technology in production often results in lower prices for consumers in markets with high price inelasticity, which the agricultural market is. It is therefore a possible solution that the consumers pay for the new technology, e.g. irrigation systems and oil presses, through tax money. Investing directly in the machines to farmers might bridge the middleman and corruption problems. If the government invest in this technology and provide it to the farmers, it could result in higher profitability for sunflower farming in the short run and lower prices for sunflowers and sunflower oil in the long run. This might also influence farmers in their choice of crops and increase the incentives of switching to sunflower cultivation from other crops since it is a clear sign from the government to smallholders of what crops are recommended to farm. When farmers adapt, it might create a ripple effect between farming villages as farmers mainly choose what crop to farm according to what their neighbours choose. Another effect of lower prices for sunflower is that the demand of sunflower will increase. This could, in turn, have a positive influence on nutrition amongst the Malawian population since sunflower seeds contain fats and proteins which are currently lacking nutrients.

An already accessible source for monetary resources are loans from financial institutions, but the high interest rates discourage farmers as it demands unreasonably quick returns on the bank's investments. Irrigation systems could lower the risk for banks as these systems can ensure higher yields since droughts are mitigated and in extension decrease the interest rates from financial institutions. Cooperatives are another way of decreasing the interest rates since the credit risk for the lending institution is split amongst groups of farmers. Apart from spreading risk, the cooperatives enable the farmers to loan both money as well as tools within the group.

Furthermore, the cooperatives enable farmers to commercialise their farming as these can jointly invest in measures to access external markets. This could reduce the amount of inter-farmer exchanges that are needed amongst different smallholders which could enable the cooperatives to become more like a corporation where these value chain exchanges are conducted internally, decreasing transaction costs. A financial issue regarding the sunflower cultivation is the transportation costs that are needed to reach the market. If every farmer were to pay for the distribution by themselves, cultivating sunflower would not be profitable compared to tobacco. Here, cooperatives could play a vital role in coordinating these transportation's, hence splitting the costs between multiple smallholders. Another important aspect is that cooperatives are equivalent to larger farm sizes which have been proven to be more productive than farmers isolating themselves.

Farmers within the cooperative could split up the assignments and focus on the task that they have the most knowledge about. Some farmers continue to cultivate whereas other farmers focus on the processing of the sunflower seed, and some of the cooperative members put more effort into the logistics, economics and marketing of the sunflower to internalise and enhance the entire value chain. This would reduce problems with high transaction costs, high risks and information loss since

transactions take place within the cooperative, which also leads to fewer farmers selecting out of markets. However, segregation might occur between the groups of farmers that have the possibility to merge into cooperatives and the groups which do not. If a strategy of incentivising cooperatives were to be implemented, segregation could be taken into account by e.g. providing farmer without the geographical opportunity to create cooperatives with tools or credit interest subsidies.

The economic problems in Malawi create a vicious circle where farmers are unable to develop and acquire the agricultural methods and technology needed to cultivate sunflowers in a sufficient way. This results in smaller profit margins or as mentioned above farmers self-selecting out of markets, which in extension results in loss of tax for the government. Tax losses result in a smaller budget spent on investments in the agricultural sector from the government. These failed investment opportunities could have enabled better irrigation systems and infrastructure for water in Malawi. It could also fund solar energy infrastructure, which could make the irrigation system self-sufficient by a one-time investment. By having access to sustainable power, the farmers could cultivate and harvest multiple times a year. Without this technology, the water access issues for farmers will continue to hinder them from cultivating sunflowers further away from Lake Malawi during the dry season. Without the possibility to cultivate during the dry season the profit margins for sunflower cultivation decreases, which in turn results in tax losses for the government that is continuously repeated in a negative spiral. If both the government would support farmers with the necessary tools and resources, and if smallholders would form cooperatives, this could disrupt the negative ripple effect creating positive economic synergy effects. Increased profit margins from cooperatives engaging in the market would yield tax revenue for the government. A great example of this is mentioned by Chimera; his village has formed a cooperative and procured irrigation systems, and was supported by a non-governmental organisation to invest in more irrigation systems enabling the village to cultivate sunflowers throughout the entire year. This also implicates that the government could support the farmers by facilitating for non-governmental organisations and foreign investors to support cooperatives rather than to invest national funds to help the farmers themselves.

Apart from the risk factor, the high interest rate is a result of high inflation. As of today, Malawi has around 9 percent of yearly inflation but the rate is slowly declining. If farmers were to switch from tobacco to sunflower cultivation it would result in high initial investment linked to new tools. Therefore a high, yet declining inflation rate is a good incentive for the farmers to switch as soon as possible rather than save up money which will continuously decrease in value.

Another way for the farmers to get around the financial issues of switching to sunflower cultivation is by getting help from private investors. Much like in the case of CASS, a private actor could work to bridge the gap between smallholder farmers and financial institutions. This actor could lower the risk, both for the farmers as well as for the financial institutions by insuring both parties, incentivising smallholder farmers to take the risks of transitioning to a totally new crop. Grundfos is a foreign

investor also working to link farmers with banks. They are ensuring that both parts keep their initial agreements by improving the communication channels.

To conclude, one action that could both increase the output of the agricultural sector and at the same time facilitate the transition to sunflower cultivation, in the long run, is that the Malawian government invest in new technology, e.g. irrigation systems and solar energy, for the farmers with tax money. This solution could influence farmers in their choice of crops and create a ripple effect between farming villages. If the government were to invest in irrigation systems and enabling external actors, e.g. investors and non-governmental organisations, the vicious circle of economic problems could be broken, resulting in new technology for the farmers and more tax money for the government. This action is supported by the fact that Malawi currently has high inflation levels, making it favorable to invest in physical assets instead of saving it as hard cash. Another action to reduce the problem that limited financial resources cause is to create farming cooperatives. This would be beneficial since it could decrease the risk of banks and investors to loan farmers money and would increase the possibility to invest in necessary equipment that sunflower cultivation requires. Cooperatives would also be beneficial in terms of splitting costs of transporting the crops to markets. Finally, the gap between financial institutions and farmers could be bridged by external actors that can decrease the financial risk for the banks and at the same time incentivise farmers to take risks of transitioning to a totally new crop.

6.3 Corruption and deficient governmental institutions

Problems with corruption both on a governmental level, but also on a decentralised level have created market failures and community failures in Malawi, creating a barrier for farmers' transition from tobacco to sunflower cultivation. There are many examples of solutions to problems regarding market and non-market institutions with different degrees of success. Despite that it might seem like a reasonable solution, decentralising the decision making (through e.g. assigning authority to village chiefs) will probably not be an action to reduce corruption. In addition, funding from non-governmental organisations and subsidies from the government do not reach the right people or initiatives with the current approach of financial help for agriculture in Malawi. This approach is built upon funding of entire villages and cities with hard cash that the village chief, a middleman, manages. Instead, a solution that utilises ear marked and precise allocation of subsidies to for example crops, machines and farming equipment is a way to really affirm that resources do not fall into the cracks of bureaucracy. The success of the allocation of governmental resources in the case study on hybrid maize validates this approach. As there are poor information channels in Malawi a case can be made that middlemen are needed to, on a local level, understand where resources should be allocated. However, the middlemen should not be granted decision making authority and monetary resources. Therefore a solution could be to assign specific people to just do the task of finding

suitable actors or resources for subsidies, and that a central institution assigns the actual funding.

Another problem that is rooted in the challenge of corruption and deficient governmental institutions is that the entrepreneurial activities are insufficiently supported. Concrete examples of this are Khonje's project of implementing self-sufficient water pumps and the difficulty and consequently the discourage the Asian investors experience when trying to establish businesses in Malawi. Von Homeyer has also experienced this problem and has dealt with this by only using local resources. This hinders the possibility of expansion since traversing national boundaries to cooperate with foreign enterprises is a complex and costly process. Therefore, institutions promoting entrepreneurship, lawmaking that requires shared ownership between Malawians and foreign investors, and tax regulations that stimulate entrepreneurial activities are all activities that need to be promoted to increase incentives for creating and facilitating business opportunities. Parallel to this, it is vital that the authorities comprehend the needs of businesses in order to promote entrepreneurial initiatives.

From another point of view, corruption is expressed in terms of lack of social trust. The farmers exemplify the lack of social trust by describing that it is one of the main obstacles for selling their produce on the market. In order to bring the produce to the market, there needs to be an external actor that takes care of the transport and the sale. However, the farmers are hesitant to use these external actors as they do not have trust that the actors will pay them the fair market price for the sold produce. A contributing factor to this lack of trust is a previous history of middlemen cheating with fair payment to the farmers, keeping a cut for themselves. Social capital is an essential institution for making people trust entered agreements and consequently dare to invest in businesses. Hence, it appears that strengthening the social capital between the actors in the Malawian agricultural sector would be an important contribution to make the distribution of sunflower seeds more efficient and increase the incentives for investing in sunflower production.

One way of strengthening social capital is strengthening property rights. In the two cases from Ghana and Georgia, blockchain was implemented in the land title registries. The aim was to get access to the technology's traceability and transparency features, which facilitates understanding and legitimising transactions of land titles between actors. Farming produce, e.g. sunflower seeds, is also a type of property that could be traded as tokens. Hence, blockchain could be an appropriate technology to implement in order to facilitate its trade. With the recent country-wide development of mobile networks in Malawi, there seems to be a big potential for Internet-based solutions such as blockchain. However, it is important to consider the insights gained from the studies conducted in Ghana and Georgia, namely that it is crucial to engage many different stakeholders and also support the initiative with education and tax incentives. Without these factors in place, it seems to be hard to implement a blockchain system to strengthen property rights and thus gain the traceability and transparency advantages of such a system. Even though, there are promising and newly installed mobile networks in Malawi, careful consideration

has to be done regarding the challenges that can arise when implementing advanced technology in a developing country.

The current system of financial help for agriculture is to fund entire villages or cities with money, which then is distributed to different projects and stakeholders by the village chief. This procedure is set for corruption, according to Khonje. Instead, machines and farming systems should be subsidised for farmers in order to control who receives the money and for what purposes. This is just one example of problematic middlemen when non-governmental organisations and private companies are distributing equipment, seeds, and fertilisers. To make sure that farmers are the group that benefits from these kinds of actions, more solutions as the one previously stated are needed.

Solutions to the challenge of corruption might to a varying extent be well-functioning in a country such as Malawi. One solution that has been proven successful in other similar environments is ear marked subsidies. This solution will be less affected by the negative sides of bureaucracy and is at the same time validated by the hybrid maize case study. Moreover, the middlemen's possibility to make decisions should be decreased in general, not just in the case of distributing money. Corruption might be reduced by encouraging entrepreneurial activities, and inviting external actors to participate in the country's growth opportunities. As it is common that foreign investors become discouraged, a solution is to build businesses solely on local resources. The lack of social capital and trust causes problems regarding transportation, preventing farmers from selling some crops on the markets. One way to solve this problem is by using blockchain to understand and validate transactions in the country.

6.4 Gender inequality

The challenge of gender inequality has many implications on society and, especially, societies that heavily depend on agriculture. Women are systematically discriminated when it comes to education and this, in turn, has long term consequences on their influence in agricultural practices and decision making. In the extension this hinders the transitions from tobacco to sunflower cultivation.

The consequences of women's lack of education are found to be limited access to productive resources such as land, labour, advisory, extension services, and financial services. It is further noted that they consequently are excluded from the credit and financial markets as well as having a lower rate of modern inputs application, such as chemical fertiliser, pesticides, and improved seeds. This systematic discrimination and web of constraints heavily restrict women's possibilities and the full utilisation of the agriculture's potential benefits, nevertheless the obstruction of the transition from tobacco to sunflower cultivation.

With this as background, actions that have to be made in order to solve gender inequality should first and foremost focus on educational efforts towards women in

agriculture as it is probably one of the most efficient ways to increase the women's impact in the Malawian agriculture. This challenge is a complex problem since the solution directly requires a cultural shift, namely giving the young girls the same possibility of education as the boys. The shift would imply that the household will, in a short term perspective, lose the girls who previously carried out the chores. This would most likely lead to resistance from privileged actors in society. The educational efforts that are needed are not only limited to young age but there also need to be an opportunity for older women to further educate themselves or that previously never got the chance. An example of this kind of education initiative can be found in the case study from Nigeria which highlights the education in the management of information and communication to women. In addition to the above mentioned traditional education, it is just as important to offer women to learn about modern agriculture practices and the advantages of new crops.

Another type of solution to solve the gender issue is to promote women to take on leadership roles within agriculture. This solution is suggested by Khonje as well as the case study conducted by the United Nations that can be read about in section 4.3. A potential result of this could be that women, to a greater extent, could have an influential role in the decision making which in turn could lead to women having more responsibility in questions regarding financial and general managing. Successively, women would have more collateral and, therefore, a better chance of being granted loans and financial funds. However, this solution suffers from the same complexity as the educational efforts, since the decision making in agriculture in rural areas is patriarchal. One way to facilitate and implement the encouragement of women taking on leadership roles is to cooperate with non-governmental organisations. This is affirmed by what Khonje mentioned about how non-governmental organisations are starting to realise that it is better to reach out to them first. In addition, it is crucial to underline that by encouraging women to take on leadership roles it would require a major change in the current distribution of housework since it is unsustainable if the women are supposed to carry on with their, already faceted role as responsible for housework, and at the same time work as leaders. Instead, it is needed for household chores to be split up fairly between women and men, for the women to take on leadership roles. This of course, will be difficult due to the cultural gender structures and expectations.

From another point of view, directly giving women property rights would also be one of many solutions that could be suitable in order to solve the gender issues. The reason for this is that with secure land property rights, women would have the possibility to participate in resource utilisation decisions, e.g. what crop to cultivate, how to enhance their yield, and improve the household's food security. In addition, property rights give the women collateral and thereby help them get better access to the credit market. Furthermore, it gives the women authority to choose who to sell to and when. However, securing that the women are given the property rights it would be safe to consider using the blockchain technology as described by OECD in their case study. By implementing blockchain, there are of course risks and bureaucratic difficulties that have to be carefully considered. The risks as well

as how to deal with them are addressed in the discussion regarding corruption.

A different take on tackling the issue of gender inequality is to address the policies and laws that actively discriminate against women. The case studies highlight this problem by underlining the important role that institutions, such as the government, policymakers, and donors, play as they are in charge of overcoming the current constraints that women experience. Gender-neutral policies are therefore a necessity. However, given the existing inequality, gender-equal policies are insufficient, and therefore, much more is needed to overcome the constraints faced by women.

Lastly, a solution to raising awareness of women's important role in agriculture would facilitate the transition from tobacco to sunflower cultivation. The solution would involve a demonstration of this by including e.g counting work at home as employment in the national statistics. The effect of this would be the women's contribution would carry more weight and thus achieving better collateral which in turn would increase their possibilities of obtaining loans as well as a more influential role in the agriculture decisions.

To conclude, as women make up the clear majority of the agricultural labour force, it is crucial to reach out to the women in order for a shift from tobacco production towards increased sunflower production to happen. Several solutions are suggested but the main solution is to change the culture by letting young girls become educated, an initiative that could be initiated by the Malawian government or non-governmental organisations. This is important since education is a significant parameter in the later on decision-making in agriculture. In addition, it would reduce the risk of women being diminished by carrying out physical labour and not being accounted for. Education in later stages of life are also important, especially in educating women about modern agriculture methods and the advantages of new crops. It is also suggested that programmes held by non-governmental organisations that empower and encourage women to take on leadership roles are a good way of tackling the gender issue. Further solutions are to make the policies and laws more gender-neutral and to give women property rights in order to increase their influence in agriculture decisions. The latter solution is suggested to be implemented by using blockchain. Another way of strengthening the women's position in society is to recognise the work carried out in the household more for it to be distributed more equally between men and women.

6.5 Education and information

The lack of education and efficient ways of information sharing in Malawi seems to cause problems for the transition from tobacco to sunflower cultivation. Since the demand for sunflowers is higher than the supply in Malawi, information sharing regarding which crop to cultivate is a hinder for the farmers. Problems such as shadow pricing and non-optimal distribution of resources arise from the same issue, namely poor information access amongst farmers. This results in higher productivity on the food market which in turn could lead to a reduction of extreme hunger,

especially in combination with farmers choosing to cultivate nutrient crops rather than tobacco. As investments in human capital have larger positive impacts on well-being and health than welfare interventions in the long run on, especially in poor areas, education in both farming techniques and differences in externalities of different crops is something that should be considered. With the right solutions to these problems, the transition to sunflower cultivation could be accelerated and at the same time, the health of the Malawian people can be improved.

Malawian farmers have a history of cultivating tobacco and are not educated and informed on the benefits with switching to sunflower cultivation, which can be less evident than the short term economic incentives to cultivate tobacco. Chimera states that he is the one who is educating the farmers, yet, he himself has no formal education. This means that extensive workers, the ones bringing new information to the farmers, are unable to inform the farmers on why and how to diversify their cultivation. Consequently, the knowledge and tools needed are to a varying extent absent on all levels in the agricultural sector. This poses a challenge that could be solved by educating the extensive workers, both in new farming technologies as well as in what crops that is most profitable in the long run for the society in its entirety. A strategy where some extensive workers receive education would have a lower initial cost compared to educating every single farmer, yet, the output would be very similar in these cases. The reason for this is that the information eventually will reach the farmers due to knowledge sharing amongst the extensive workers. In this way, the farmers will keep their incomes and will in the long run get better information about vital parts of their agricultural work. Offering simple education does not have to incur high costs for the government, especially not compared to the income the education might yield in the long run, not only for the farmers themselves but for the entire Malawian society.

To make education attractive for the farmers, it could be assumed that it has to be offered in a way that does not force them to cut down on their production and their already low profits. Therefore, educating farmers all year round would in most cases be unsuccessful. The farmers earn the majority of their income during the farming season. The rest of the income comes from the off season where some farmers choose to move to South Africa and engage in guest work. The rest are cultivating on a smaller scale by renting irrigated soil, which does not yield any income, but food for the families. The same applies to the extensive workers. Hence, offering education at a low or zero cost to the extensive workers in the off-season could be a successful way of sharing new knowledge at a low cost, this is substantiated by Khonje. Due to knowledge sharing within the communities and between humans, the educational impact could become exponential, which is a good example of how network effects rapidly make a substantial impact. This means that a minor financial investment could lead to a major positive impact on the Malawian smallholders and society as a whole.

Malawi's poor information channels create an information lag that has unfavourable effects both on the supply and demand side of the agricultural market. The supply

side, the farmers, are not updated on demands on certain crops and often choose to produce only for their own household even if there is a market for their crops. Since the farmers can grow a certain crop for years without knowing that there is a more attractive alternative on the market it results in a faulty supply that does not reflect the actual demand. Chimera mentions that the major motive for a farmer to switch crop is by noticing that a close neighbour has switched, further distancing supply from actual demand. These problems have resulted in a demand for sunflower that is far larger than the supply in Malawi, which has led to imports of sunflower products from South Africa. Governmental institutions such as the Ministry of Agriculture could help the farmers by developing information channels between smallholders, i.e. the supply side. Connecting smallholders through e.g. forming cooperatives and exploring technology solutions could strengthen the bargaining positions of the smallholders in a market where prices often fluctuate rapidly. The strengthening of their bargain positions could be concretised by better communication tools that enable smallholders to communicate with each other and settle a common price within the communities.

Malawi Mangoes is an example where a foreign actor successfully has connected smallholder farmers with foreign demand. Furthermore, Malawi Mangoes' strategy consists of creating farmer collectives, freeing time for farmers to be educated on efficient cultivation and characteristics of the mango market. The farmers can then bring this knowledge to their villages and continue to supply Malawi Mangoes with high quality production. This shows that foreign actors with more developed information channels can create successful businesses in Malawi by linking foreign demand and also by equipping smallholder farmers with farming technology and education. Since not only the domestic but also the foreign demand is bigger than the current supply of sunflower seed, the same thing could be done with this crop. The government has to facilitate for these kinds of measures implemented by private actors. One action that could be made by the government is to actively redistribute land to create opportunities for larger farm sizes and facilitate for cooperatives as well as co-owning to be implemented.

Although there are many incentives for Malawi to make their farmers switch from tobacco to sunflower cultivation, the speed of change seems to be slow. One of the reasons for this could be that the Malawian agriculture is stuck in a form of path dependency as tobacco cultivation has a long history as the main crop to grow. Over time, this has made it more difficult and expensive to switch from tobacco to another crop, such as sunflowers. This can be explained by the concept of network effects, where tobacco cultivation with more and more adopters has led to a lock-in where a possibly superior crop, like sunflower, has become locked-out. The established tobacco market is more developed and therefore more accessible compared to the sunflower market. This demonstrates a market failure that would motivate some kind of overriding coordination.

A previously mentioned alternative could with governmental cooperation potentially be overriding coordination, namely subsidisation of sunflower and taxation on to-

bacco cultivation. This action might raise the curve for sunflower production and lower the one for tobacco cultivation, as seen in Figure 6.2. In this way, sunflowers might eventually have higher returns to adoption compared to tobacco cultivation and thus in theory this would lead to farmers switching from tobacco to sunflowers.

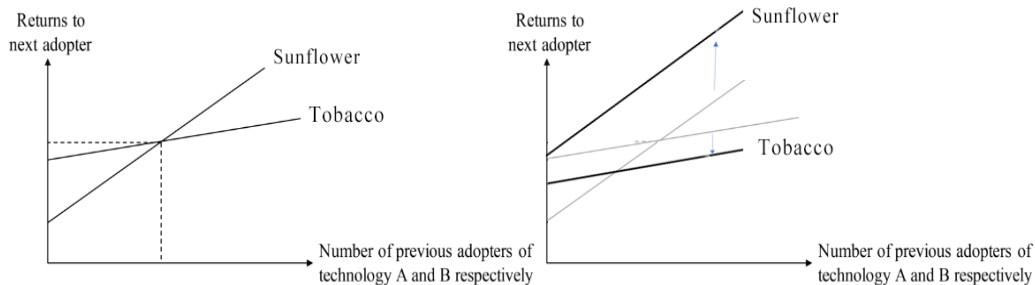


Figure 6.2: An illustration of how taxation on tobacco and subsidisation of sunflower affects the initial return of adoption respectively. Retrieved from (Granstrand, 2016).

Regarding which measure is the most effective, subsidisation or taxation, it can be argued that taxation would be the best choice. Governmental subsidies on hybrid maize showed that the subsidies did not create any long-term positive effects for the maize cultivation since the governmental support was weighed in the normal price. This means that a reduction in subsidies would have made it difficult for small companies to compete. Therefore, taxation could be a more suitable option. Anyhow, if the government were to use subsidies, it could be more efficient to provide these subsidies to those who lack access to commercial markets or otherwise do not use fertilisers, which is often the case in Malawi, since they achieve higher yield responses.

Concluding the discussion of this challenge, information lags in the Cob-Web model and the phenomena of path dependency could be parts of the explanation to the market failures that prevails on the Malawian agricultural market, resulting in an excess supply of tobacco and a demand surplus of sunflowers as well as hindering the transition between sunflower and tobacco. Governmental institutions investing in human capital will potentially result in a higher understanding of the farming profession and the agricultural market mechanisms. The cost of coordinating and educating a few extensive workers during the off-season is probably low in relation to the return that investments in human capital and knowledge sharing might lead to in the long run. The Malawi Mangoes case implies that it is a successful strategy to coordinate farmers into cooperatives to free up time for farmers to participate in these kinds of education projects. The solution of sunflower subsidising and tobacco taxation is relevant for this situation too, being a potential foundation for the transformation of the agricultural market's lock-ins and lock-outs.

6.6 Potential implications on United Nation's sustainable development goals

In 2015, the members of the United Nations embraced a universal agenda consisting of 17 global goals for economic, social, and environmentally sustainable development (United Nations, 2019). The result of this report in terms of the impact on these from a holistic view is that it could raise awareness of the agricultural challenges Malawi is facing. By addressing the solutions to these challenges as well as the associated risks, the report could support either the Malawian government, private investors or non-governmental organisations to get a better understanding of how to contribute to the development of Malawian agriculture. To describe how the report contributes to the United Nation's sustainable development goals, solutions to the identified challenges will be used as a basis to analyse the potential impact of the report. A related point to consider is that every solution to the identified challenges is contributing to multiple goals. However, as far as possible, connections between the provided solutions and the sustainable development goals are further established.

No poverty (1), is the goal which is mainly applicable to this project. Of course, none of the proposed solutions, will change the current poverty situation in Malawi in a short period of time. Although, by increasing the incentives for the farmers to switch crops from tobacco to sunflower, by focusing on the solutions regarding limited financial resources, Malawian smallholders, in particular, would have better access to monetary resources. Since 80 percent of the population is working in agriculture, this could have a positive impact on reducing the Malawian poverty. Likewise, these solutions could contribute to the goal of *sustainable communities and cities (11)* since it facilitates the formation of more long term cooperatives and breaking the vicious circle of economic problems. Moreover, solutions regarding the challenge of the farmers' short-term economic incentives could first and foremost contribute to the goal of *no poverty (1)*. This is done by increasing the farmers' margins since it would consequently increase the labour.

Focusing on education and information could bring Malawi one step closer to reaching the goals *zero hunger (2)*, *decent work and economic growth (8)*, and *responsible consumption and production (12)*. The first goal is reached by improving information channels in order to establish better market communication. Similarly, a more educated nation could generate better working conditions and lead to long term economic growth. Finally, with better communication and a more educated population, both in terms of traditional education and agricultural practices, could in the longer perspective lead to more responsible production as well as consumption.

Targeting the solutions regarding the challenge of gender inequality would mainly contribute to the goal of *decent work and economic growth (8)* since women today are heavily discriminated in the Malawian society. The contribution can be concretised as improving work conditions for women. In addition, as women play a significant role and make up the majority of the labour in agriculture, these solutions could

lead to economic growth in the long term.

Finally, helping to solve the challenge of corruption and deficient governmental institutions would also contribute to the goal of *decent work and economic growth* (8). By making the government more effective, the Malawian economy could grow and by reducing corruption, the working conditions in Malawi would improve and the country would be more attractive to foreign investors which could benefit from economic growth.

7

Summary and conclusions

The work with this thesis started by answering the first research question, which resulted in identifying five challenge areas for Malawian farmers to switch from tobacco cultivation to sunflower cultivation. In this chapter, the second research question will be answered by describing the presented solutions from chapter 6 to identified problem areas. Moreover, the problem areas and the causality between them, and solutions will be analysed through vicious circles that demonstrate how they relate to each other in terms of how proposed solutions could counteract these vicious circles. Finally, subjects of the thesis that has not yet been developed in-depth will be presented to give an idea of how and what to further research.

7.1 Summary

To summarise, the solution to the challenge of short-term economic incentives could be to internalise the externalities of the sunflower respectively tobacco production by subsidising the number of produced units of sunflowers, which would be financed by a progressive tax increase on tobacco production. The challenge of limited financial resources could be solved by investing in irrigation systems with the aim to increase the agricultural output. Another solution would be to create farming cooperatives, which could decrease the risk for debt holders and enable shared investments in bigger machinery. Creating farming cooperatives could also combat the challenges related to education and information by facilitating the organisation of education for farmers as investments in human capital will result in a higher understanding of the farming profession. Challenges related to gender inequality could primarily be encountered by educating young girls and further to educate women in later stages of life. Another action could be to use non-governmental organisations to empower and encourage women to take on leadership roles. Lastly, the main solutions to corruption were identified as ear-marked subsidies as a way to decrease middlemen's roles in the decision-making and to increase social capital by blockchain systems.

7.2 Conclusions

Although these solutions may seem equally important in isolation to their respective challenges, Malawi is one of the poorest countries in the world and the local

resources are scarce. The reality is not so simple that these solutions can be implemented without further ado, it is rather a matter of priorities. Comparing challenges that affect different groups of inhabitants in different ways and to varying degrees is complex. Furthermore, the proposed solutions and challenges are interdependent which makes a comparison between isolated solutions complicated. However, anchoring the conclusions of this report, in reality, is nothing that can be ignored.

Against this background, an attempt to visualise the problems' and solutions' interdependence has been made in Figure 7.1. The grey circles contain these interrelated problems. The cloud represents how corruption contributes to the rise of multiple other problems. The red arrows demonstrate how the problems are interdependent (i.e. problems in one area will in its turn create one or more problems in other areas). It is important to emphasise that these negative effects will continue to increase with every lap in the circles that are presented below, i.e the negative outcome of one problem will contribute to the growth of another problem. However, by focusing on the solutions presented in the previous section, i.e. the green arrows listed without mutual order between 1 to 5 below Figure 7.1, the problems could be mitigated. Weakening a problem or breaking a linkage between problems in the circles, can improve the conditions in Malawi in the future. Since the problems in the figure are derived from the challenges that hinder the switch from tobacco to sunflower cultivation, it may also be argued that by impairing the vicious circles, this transition will be facilitated.

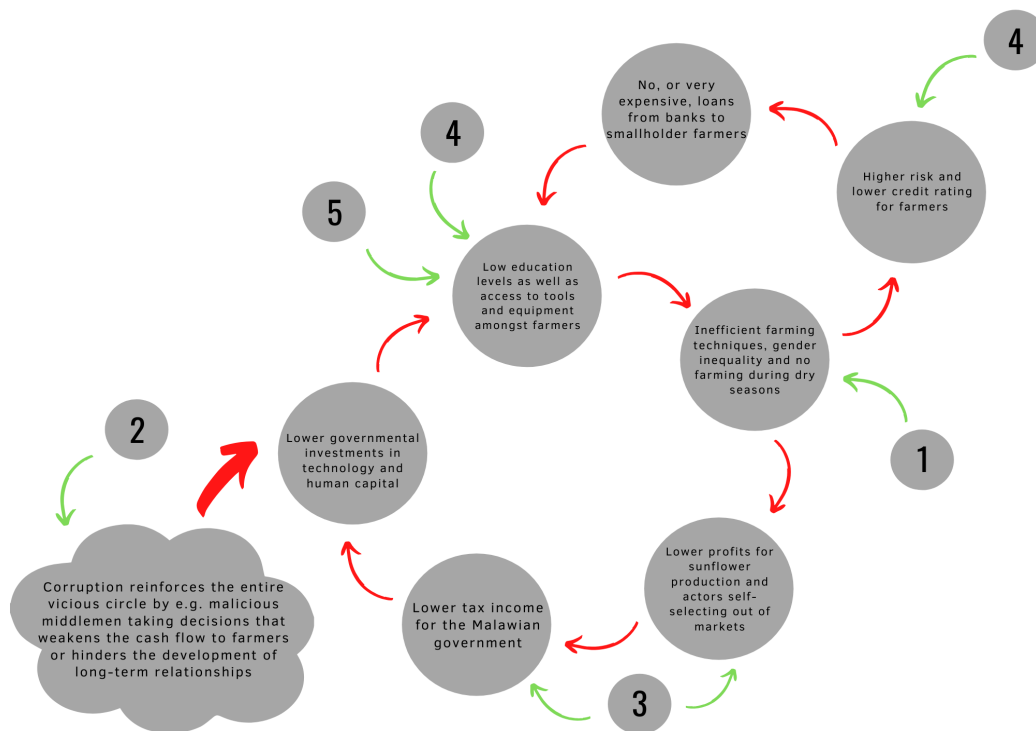


Figure 7.1: A visualisation of the vicious circles and their remedies.

Here, the solutions of this report are listed, without mutual order, as presented in Figure 7.1:

1. Investments in irrigation systems by governments and non-governmental organisations as well as facilitating for farmers to create farming cooperatives (Infrastructure).
2. Ear-marked subsidies for tools and equipment in sunflower production, as well as increasing social capital by e.g. using blockchain (Earmarked subsidies).
3. Internalising economic externalities by establishing subsidies on sunflower production and taxes on tobacco production (Internalising externalities).
4. Investments in human capital by forming farming cooperatives and offering education services (Human capital).
5. Educating, encouraging and empowering women of different ages through education programmes (Empower women).

A number of decisions have been made by various actors throughout history that affect Malawi's current situation, also known as the previously discussed phenomena, path dependency. There is no individual responsible for Malawi slowly but surely being stuck in these vicious circles. What can be done to improve the future situation is to focus on how this self-reinforcing negative cycle can be weakened to the greatest extent possible. The problems of the model can possibly be countered by the solutions presented in this report.

Even though it can be difficult to draw conclusions about how prioritisation of these solutions should be made, since e.g. they require different amounts of resources. Solution 4 (Human capital) and 5 (Empower women) both contribute to counteracting the problems regarding low education and limited access to tools. Counteracting these problems could be seen as especially important as it would impact both vicious circles. Moreover, solution 4 (Human capital) does not only counteract a problem linked to both circles but it also has positive effects on another problem, besides education and access to tools, which are closely linked to high financial risks and lower credit rating for farmers. In the same way as solution 5 (Empower women), solution 1 (Infrastructure) impacts both vicious circles as it is directly linked to the problems regarding gender inequality and inefficient farming which in extension has linkages to both vicious circles. This justifies that the solutions 1 and 5, even though they only affect one certain area of problems, are of great importance.

The cloud-formed challenge regarding corruption accelerates both vicious circles and affects all challenges which shows that solution 2 (Ear-marked subsidies) is imperative to facilitate for the transition in Malawi and should therefore also be highly prioritised. However, since it is a more comprehensive problem, it is difficult to draw a conclusion on how the solution should be prioritised in relation to the other solutions. Since solution 3 (Internalising externalities) affects two problem areas but does not affect both circles it might not have the same synergy effects on mitigating the vicious circles as the other solutions. However, the implementation of solution 3 (Internalising externalities) could be considered less complex than the other solutions as it has already been implemented to a small extent in Malawi.

In order to accelerate the switch from tobacco to sunflowers, all challenges need to be dealt with, but preferably in a specific order. Against the background of the above causal relativisation of the problems, it is possible to prioritise the solutions. To achieve a maximum return on investment when trying to solve these challenges, the focus should be on the solutions that to the greatest extent impair the vicious circles.

7.3 Further research and limitations

The focus of this thesis has been to identify challenges with the transition from tobacco cultivation to sunflower cultivation and combine these challenges with relevant theories from academic literature to form solutions. As the report has looked at a comprehensive picture of the problem, it has consequently investigated several

and general solutions to the challenges. The downside of this choice is that within the limits of this report, it has not been possible to investigate the advantages respectively disadvantages thoroughly for each solution. Further studies about the suggested solutions and how they can be implemented in a local context should be conducted. The upside of this choice is that this report is very useful for each actor that wants to develop the sunflower production in Malawi. Such an actor can then use the report for obtaining a wide picture of the situation and find well-defined subject areas for further research. Two subject areas that the thesis authors have found interesting for further research will be described here.

Increasing solar power in Malawi has been described as one way of facilitating irrigation systems. However, it is likely that the development of solar power will have many more advantages for sunflower production and its workers, e.g. providing electricity for household appliances and communication with investors and purchasers. Gender inequality has been found to be a complex issue within sunflower production with both many interwoven causes and solutions. It is probably more prosperous to address specific issues related to gender inequality than to address the issue comprehensively if implementable and efficient solutions should be formed. Non-governmental organisations work with empowering women to take on leadership positions is such an issue that has the potential to be investigated with a delimited set of actors and a quantitative approach, in order to define efficient solutions.

Many of the suggested solutions to the challenges in the thesis have a clear connection to several of the United Nation's sustainable development goals, which has been described in section 6.6. Retaining the connection to these goals in any further research or work with these challenges and solutions, is an efficient way to emphasise their importance for external stakeholders and thus increase the chances for external funding or support in other ways.

This report originated from contacts with the food tech startup SunFeeds which is developing a sunflower seed-based RUTF product. Currently, they have plans of starting a pilot project for local production of their product in Malawi in the near future. Gaining a wide understanding of the already existing local production of their main raw material, sunflower, is an important part of the startup's preparations for the pilot project. This report can hopefully contribute to these preparations together with the report authors' personal experience from and established contact network Malawi. The thesis authors are excited to follow the future development of SunFeeds and be able to contribute with experience and motivation to SunFeeds upcoming projects.

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