

Small-scale edible oil milling operations

Alternative business models for Ethiopia



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We are most grateful for the time and patience of the millers, other entrepreneurs and sector specialists whom we asked so many questions. These are the most critical players in the process of continuously innovating and changing in order to realise a sustainable domestic edible oil sector that provides income, employment and a healthy diet to many Ethiopians. We sincerely hope that this publication, and its follow-up, will be of use to a large number of them.

Acronyms and abbreviations

AAOMA	Addis Ababa Oil Millers Association
BoP	Base of the Pyramid
CSA	Central Statistical Authority
EIAR	Ethiopian Institute for Agricultural Research
EIA	Ethiopian Investment Authority
EGTE	Ethiopian Grain Trade Enterprise
ETB	Ethiopian birr
ERCA	Ethiopian Revenue and Customs Authority
ECX	Ethiopian Commodity Exchange
FAO	Food and Agricultural Organisation of the United Nations
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
GTZ	German Technical Cooperation
IMF	International Monetary Fund
KG	Kilograms
MCO	Marketing and Cooperative Office
MoH	Ministry of Health
MoTI	Ministry of Trade and Industry
PRB	Population Reference Bureau
QSAE	Quality and Standard Authority of Ethiopia
SNV	Netherlands Development Organisation
UNIDO	United Nations Industrial Development Organisation
WEF	World Economic Forum

Terms and definitions

Miller	One who produces and sells crude oil
Processor	One who produces and sells refined oil
Government	Government of Ethiopia
Trader	One who buys stock and sells oilseeds
Broker	One who brings buyers and sellers together

Summary

S.1 Key results

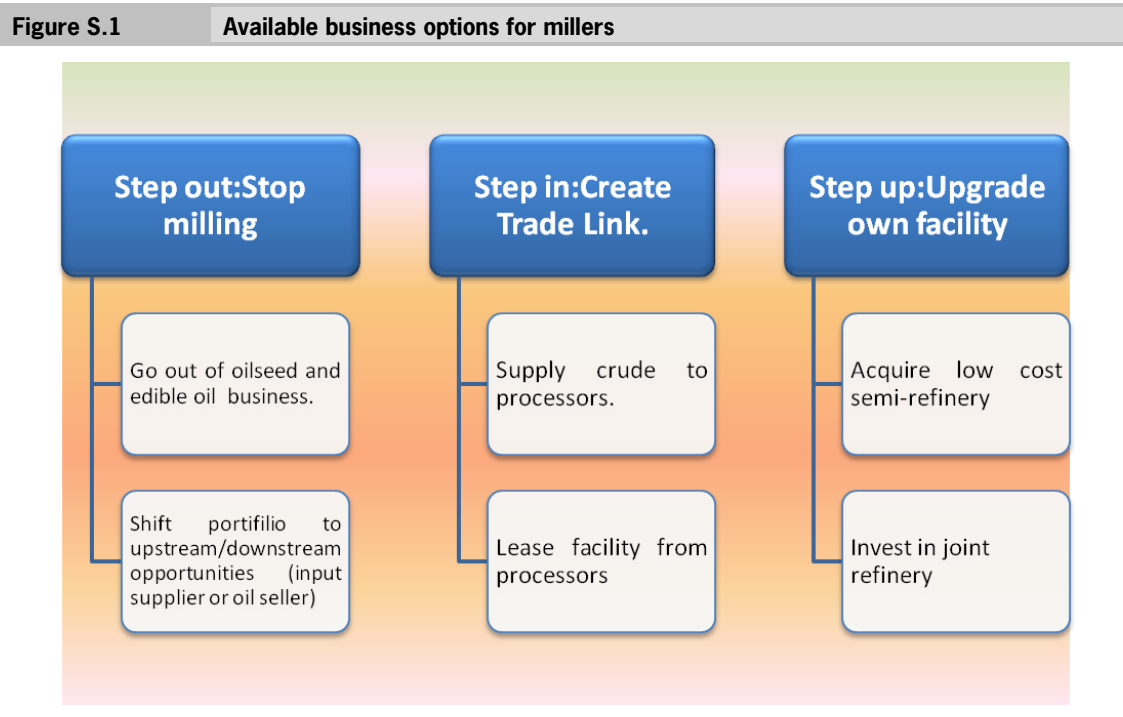
Small scale millers in Ethiopia have three options to respond to a new law that requires the production of refined or semi-refined oil:

- **step-out: going out of the milling business;**
- **step-in: establishing trade links with processors;**
- **step-up: upgrading their facilities.**

Stepping-out does not seem promising, whereas stepping-in and stepping-up do.

Stepping-in, promising as current refining capacity of processors is underutilised, requires changes in existing trade relationships that are characterised by low levels of trust.

The stepping-up option - investing in a semi-refinery that meets minimal standards - is likely the preferred option for millers since trade channels remain more or less similar. Most changes will have to take place in the processing infrastructure. This option can possibly serve a different, more rural consumer market compared to the step-in option.



S.2 Complementary findings

The oilseed sector contributes significantly to overall growth and development of the country. Oilseeds are the second major export product. Despite Ethiopia being a major producer and exporter of oilseeds, it imports more than three-fourths of its domestic edible oil consumption. The sector has potential due to the increase in demand.

Small scale millers currently supply more than 60% of the domestically produced edible oil. One of the main inputs here is noug. Due to low yields, noug (or niger seed) production decreased in recent years but is picking up as noug exports grow as a result of strong international demand and depreciation of the Ethiopian currency. Government commitment for self-sufficiency by 2015 and strong economic growth are expected to sustain the growth of noug production.

For implementing the two recommended business options - stepping-in and stepping-up - and overcoming the obstacles millers are faced with, the involved stakeholders need to change concurrently. Stakeholders involved are: farmers, processors, traders, service providers (such as banks, NGOs and consultants), the government, research institutes, and sector associations.

S.3 Methodology

The study has used the 'Base of the Pyramid approach' that aims at enhancing the role of the private sector in eradicating poverty. At the heart of this is an approach that delivers innovations which are available, affordable, acceptable and accessible for low-income people. The research made use of both primary and secondary data. Primary information was gathered during in-depth interviews with selected millers in and around Addis Ababa. The research was completed with a workshop to validate and value the findings with small scale millers and stakeholders from the regulatory environment and supporting services.

1 Introduction

1.1 Rationale

The Ethiopian government is aiming to achieve self-sufficiency in edible oil by 2015. The recently released five-year Growth and Transformation Plan (GTP) underscores the importance of the agro-processing industry, which includes the edible oil sector (MoFED, 2010). While the potential for and government commitment to self-sufficiency are there, domestic edible oil millers face a myriad of challenges related to input and technology.

According to the Ethiopian quality standard, all edible oil must be refined, although a number of specific oilseeds can be semi-refined (see Appendix 1). Despite this requirement, many millers are selling crude oil particularly to the low income class. The government is planning to ban the sale of crude oil as from next year. Compounded by the input and technological challenges, this means that the future of the small-scale millers and the supply of two thirds of domestic production have become uncertain.

1.2 Objectives

The aim of this research was to develop sustainable business models for millers, increase their competitiveness, and enhance food safety and security in Ethiopia within the changing policy context. The objectives of this report are:

- to present an analysis of the opportunities open to and the challenges faced by small-scale millers in Ethiopia, with a special emphasis on noug seed millers;
- to portray alternative business models that will improve the competitiveness of small-scale millers and increase food safety and security.

1.3 Reading guide

The following chapter elaborates the methodology used. Chapter 3 presents the wider market dynamics of the Ethiopian oilseeds sector. Chapter 4 describes the key actors in the noug value chain - noug being the seed most commonly used by millers. It discusses the environment of millers and concludes that, broadly, there are three future paths for millers. Chapter 5 discusses these options in greater detail and identifies the key actors that can support the change and innovation towards these models. Chapter 6 provides conclusions and suggestions beyond this report.

2 Methodology

2.1 The BoP approach

The research adopted the base of the pyramid (BoP) approach, which aims at enhancing the role of the private sector in eradicating poverty (Prahalad, 2006):

... the BoP represents a fast-growing consumer market, an underutilised productive sector, and a source of untapped entrepreneurial energy. Engaging the 'next billions' at the BoP as producers, consumers and entrepreneurs is therefore key to both reducing poverty and driving broader economic growth, for communities and the private sector. (WEF, 2010)

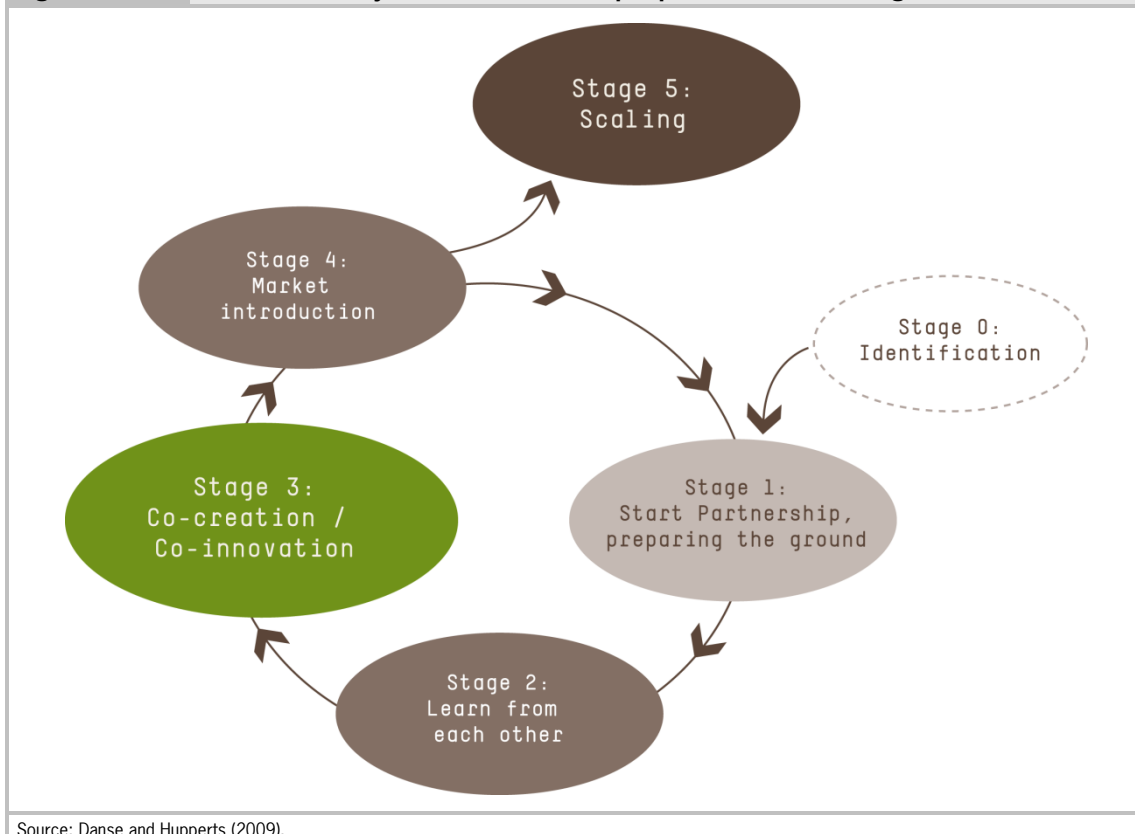
The BoP business model is characterised by a market-oriented approach to innovation that embeds sustainability through direct interventions in the value chain in combination with adjustments in the enabling environment, for example, changing the support services and the regulatory environment that might influence millers. At the heart of developing BoP businesses are the 4 A's: availability, affordability, acceptability and accessibility.

- Availability refers to the on-demand disposability of the products and services required by the market.
- Accessibility addresses goods and service distribution.
- Affordability addresses the economic power of the BoP. The main element that increases affordability is the pricing. This is directly affected by the cost structure of the production and distribution process.
- Acceptability is related to the extent to which the consumers or producers are willing to consume, distribute or sell a product.

2.2 Market based pro-poor innovation stages

This research builds on the general approach to the market-based pro-poor innovation of the Dutch BoP Innovation Center. This approach builds further on the BoP Protocol 2.0 (Simanis and Hart, 2008). The approach consists of five development stages, all of which are part of a cyclical process with feedback moments.

Figure 2.1 BoP innovation cycle for market-based pro-poor innovation strategies



Source: Danse and Hupperts (2009).

Stage 0 consists of identifying the needs, identifying stakeholders and screening the enabling environment. It provides a first map of opportunities and constraints.

Stage 1 uses the information collected in stage 0 to make a synthesis of opportunities and constraints and to identify key stakeholders. At the end of this stage, parties are identified and asked to commit themselves to a jointly agreed upon strategic development plan and to assume responsibility for specific actions.

In stage 2, parties work together closely and learn about the pro-poor innovation strategy that would best fit the needs identified. Important information collected at this stage are details about the available local infrastructure and about available substitutes to meet the needs; a detailed analysis is also made of the real market demand by the BoP market (in this case, the small-scale oilseed millers in Ethiopia). This stage also includes awareness building among local actors of the potential benefits of the pro-poor innovation to be introduced, and the training of local (social) entrepreneurs in market development strategies, business plan design and entrepreneurial thinking.

In stage 3, the pilot of the selected pro-poor innovation product or service is designed. This is done based on co-creation and co-innovation principles, so the final user of the product or service will be part of the design process, to assure that the design meet the 4 A's as explained before. Parallel to the design process, training activities of the local business parties continue. This is important because it helps prepare them for the formal launch of the product or service in the market, and rapid scaling up, which is essential in working towards a sustainable business proposition.

In stage 4, the preparations of the local entrepreneurial activities are finalised and the official launch of the product or service to the local BoP market is effected by the (social) entrepreneurs trained during the process.

This should all lead to the successful arrival at stage 5, where the entrepreneurial activities are further expanded to other local, national, regional or international levels. Important activities here relate to the identification of the specific characteristics of the new market segments for the business model defined,

including the marketing and distribution strategy, as innovations always require some specific adjustments to match the specific needs on the 4 A's of differently located BoP groups.

2.3 Methodology

This report presents the results of research activities carried out in stage 0 (partner identification) and stage 1 (business opportunities identification). Stage 0 (Chapter 4) had a strong focus on the value chain, identifying the key chain actors, the supporting services and the regulatory environment so to identify business opportunities. Stage 1 (Chapter 5) assessed these opportunities against the 4 A's that are central to the BoP approach. It also identified the actors that should play a role in the implementation of the pro-poor innovation path.

As this research was explorative in nature, a number of methodological decisions were taken in the course of it. The most important one is that millers mainly process noug seed; hence, the research focuses on noug. It also became apparent during the research that the availability of factual information about other chain actors, and particularly about more informal ones like traders, is limited.

The research used both primary and secondary data. The primary data was gathered during fact-finding missions in the first and second quarters of 2010. This included ongoing discussions with sector experts such as Ato Getachew Desta and Ato Dereje Chanie, and group meetings with three processors, four supermarkets, government officials (MOTI, QSAE and MoH), sector association members and input traders. More informal interviews were held with edible oil traders at Mercato and with consumers (met during interviews with millers). Furthermore, in-depth interviews were held with 21 millers, out of an estimated total population of 500 millers (see Appendix 3). The millers were asked about their current operations: inputs used, employees, machinery, other costs and sales channels.

Secondary data were drawn from various public sources of data on economic development, production and trade in order to analyse the external environment of the millers. The framework used here was PESTLE: political, economic, social, technological, legal and ecological factors (Johnson et al., 2005).

The research was rounded off with a workshop to validate and evaluate the findings with small-scale millers and stakeholders from the regulatory environment and supporting services. This created awareness of the suggested business models and the concomitant action agendas. Widespread awareness is essential for the co-innovation and co-creation of new business models that will deliver a more resilient edible oil value chain.

3 The Market

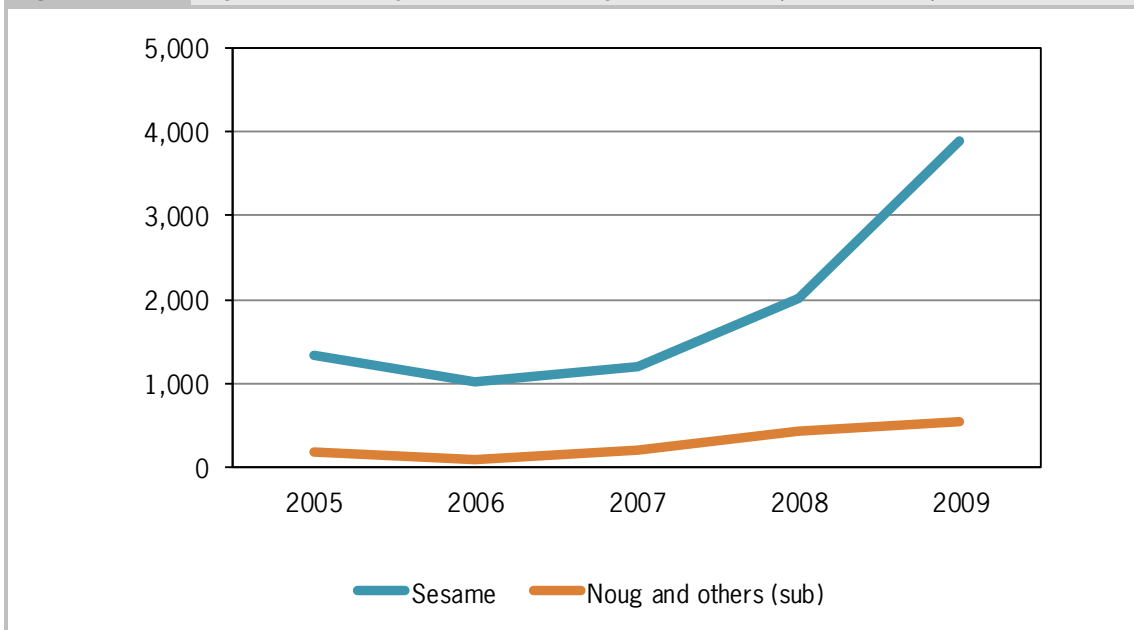
This chapter presents the market dynamics for millers in Ethiopia. We give an overview of the trends in export of the main oilseeds, followed by trends in international trade in edible oil. We then reflect on the domestic market relevant for millers from various angles: political, legal, economic, social, technological and ecological (PESTLE).

3.1 Oilseeds in Ethiopia

The oilseeds sector shows strong growth in Ethiopia, as domestic and world market demands are expected to continue to increase. The sector contributes significantly to the overall growth and development of the country. It supports the livelihoods of many small-scale farmers and businesses involved in trading, transporting and oil crushing, as a source of employment and income generation (UNIDO, 2009). Oilseeds are grown on over 3 million holdings (30% of all holdings) on 800,000 ha (8% of total acreage) and account for 5% of the country's total production of grain products (Wijnands et al., 2009). According to the CSA (2009), the country produced 0.65 million tonnes of oilseeds, creating employment and a source of income for 3.3 million people. The main oilseed crops are sesame, noug seed and linseed, which together account for 86% of the national oilseeds production. The country's diverse agro-climate provides a natural comparative advantage and ample potential to grow other oilseeds, such as groundnut, safflower, sunflower, rapeseed, soybean and cotton (EIA, 2009).

Oilseed crops account for 20% of export earnings, second to coffee. Ethiopian oilseeds are known for their flavour, nutritional value and organic production. The export value nearly tripled over the past five years (ECRA, 2010). Sesame is the most important export seed, accounting for 88% of oilseed exports. Ethiopia is the 4th largest exporter of sesame, after China, India and Myanmar. Aside from sesame, ECRA revealed an increasing trend in the export of noug seed and other seeds, primarily to the USA and countries in Western Europe for bird feed (Figure 3.1).

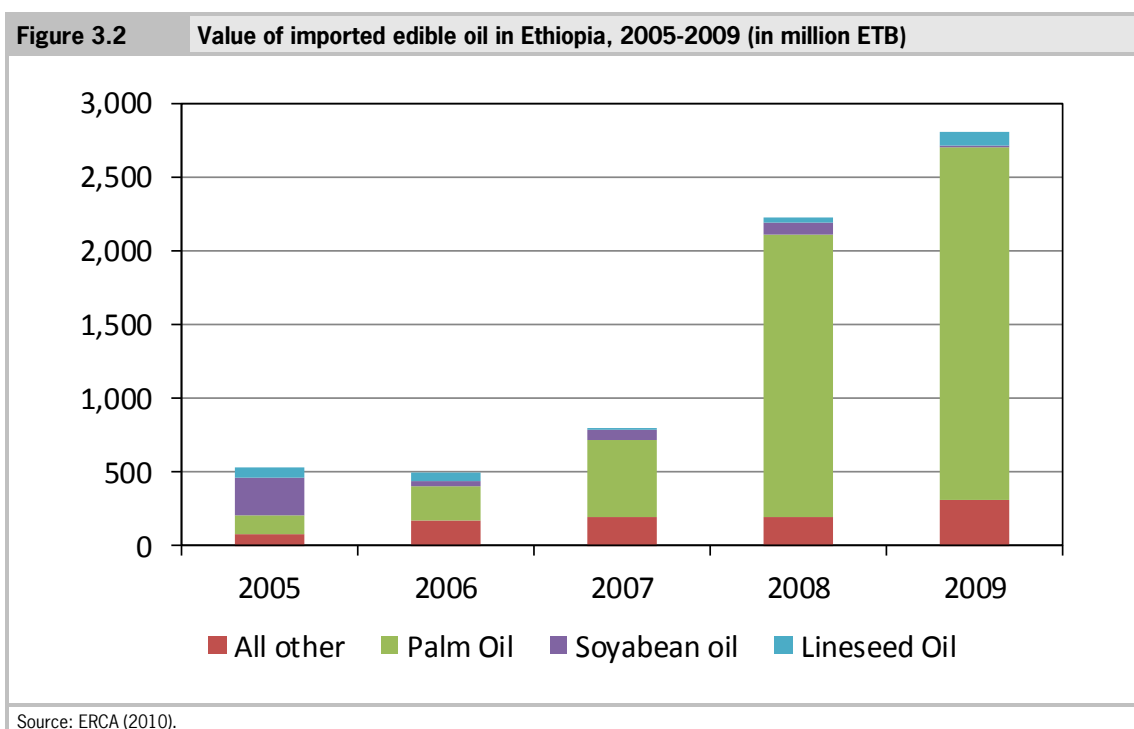
Figure 3.1 Export value of major oilseeds in Ethiopia, 2005-2009 (in million ETB)



Source: ERCA (2010).

3.2 Edible oil industry

The current annual value of the domestic edible oil industry is estimated at ETB 3.6 billion (USD 277 million).¹ Although Ethiopia is a major producer and exporter of oilseeds, the country imports about three quarters of its domestic edible oil consumption (ECRA, 2010). Imports have grown fivefold over the past five years (see Figure 3.2). Palm oil is the major type of imported edible oil. Noug oil is included in the 'all other' category, which is also a growing segment. Unfortunately, no data could be collected on the exact share of noug.



Based on interviews, domestic edible oil producers account for one quarter of the total market, equivalent to ETB 936 million (USD 70 million) annual value of production (Getachew, 2010). These producers can broadly be classified as millers (formal and informal) and processors. The former sell only crude oil, while the latter sell refined and semi-refined oil. The millers account for two thirds of the volume supplied by domestic producers.

3.3 PESTLE analysis

An individual firm has limited power to influence the environment. The most common way to analyse how future trends in the macro environment will affect a strategy is to use the PESTLE framework. A similar approach was adopted in this research to assess the macro environmental factors relevant to the small-scale millers' business.

¹ Interview with Getachew (2010).

3.3.1 Political factors

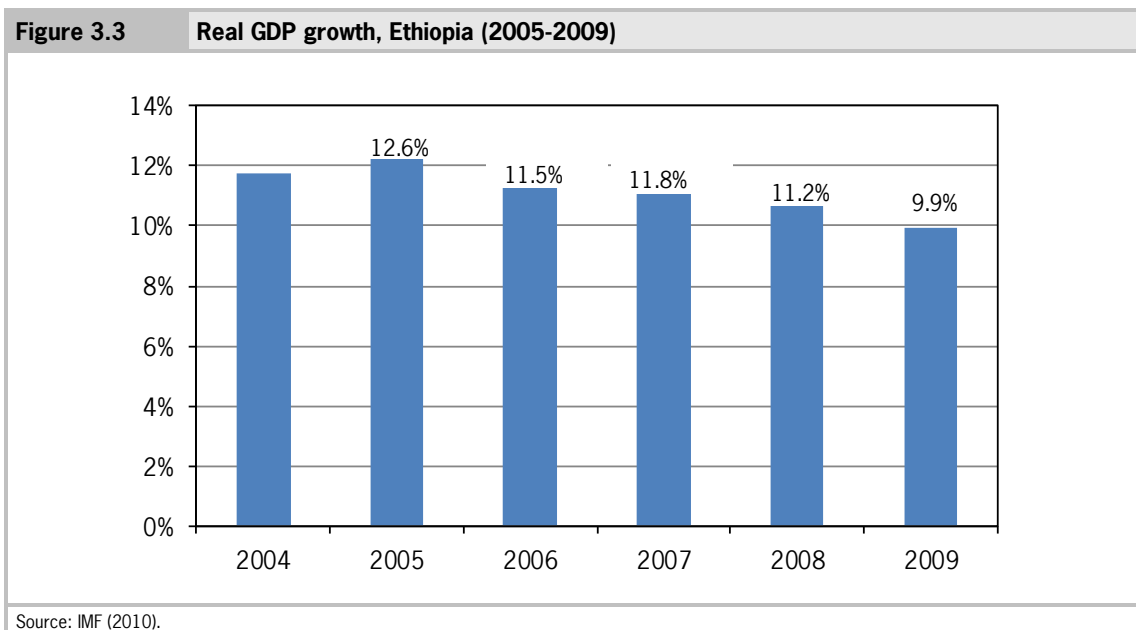
The enforcement of laws and regulations generally tends to be weak in Ethiopia, and this has led to a large number of underground operations. The sector came under increased pressure following the deaths in 2008 of people who had consumed contaminated oil (Reuters, 2008).

The government's new Growth and Transformation Plan re-emphasises the importance of agricultural in the country's overall growth and industrial development. Hence, the government strongly promotes agro-processing industries such as edible oil. The government also encourages small and micro enterprises, such as millers, as they create employment for the low-income class. According to information from MoTI officials, the government is aiming to achieve self-sufficiency in edible oil by 2015.

A number of international donors are providing support to strengthen the sector. These are opportunities for the milling industry. Enforcement of the new edible oil quality standard could also be an opportunity for progressive and innovative millers who can adopt technologies that meet the standard or can create trade links. However, it could be a threat to those millers who lack this dynamism and capacity.

3.3.2 Economic factors

Ethiopia is one of the fastest growing countries in sub-Saharan Africa. Over the last five years, the country registered an average real GDP growth of 11% (Figure 3.3). The government is aiming for a real GDP growth of 14.9% per annum for the next five years (GTP 2010, Draft).



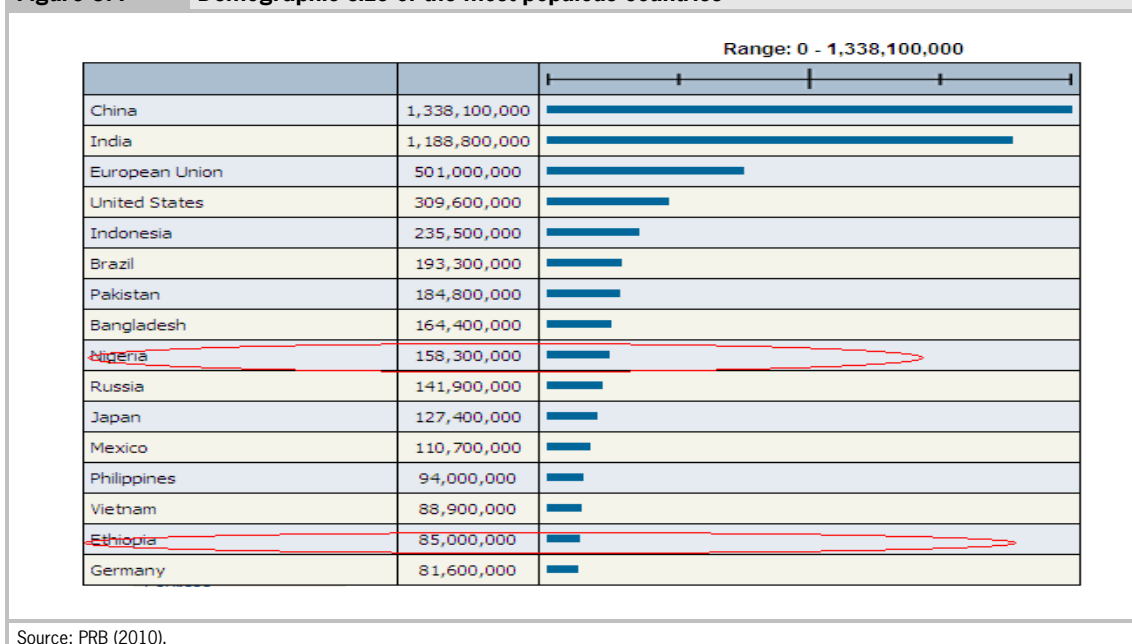
Foreign direct investment (FDI) in Ethiopia increased by thirteenfold (from ETB 7.2 billion to ETB 92.3 billion) in the period between 2003/4 and 2007/8, with the agricultural sector taking a significant share (22%) of the investment in 2007/8 (EIA, 2009). Overall, there is a positive market prospect for edible oil

The recent devaluation of the ETB against major currencies is both an opportunity for and a threat to millers. With the decreasing value of ETB, the price of imported edible oil increases, implying increased market competitiveness to domestically produced oil. On the other hand, devaluation increases the demand for the export of oilseeds, which could lead to a rise in the price of seed and thus the price of millers' oil. Since 2008, palm oil has been imported free of tax and has gained a competitive position over domestically produced oils. Access to financial services in Ethiopia is generally difficult and requires collateral, which most millers do not have.

3.3.3 Social factors

Ethiopia has the second largest population in Africa (after Nigeria) and the fifteenth largest in the world (see Figure 3.4). According to the FAO (FAOSTAT, 2010), annual per capita edible oil consumption in 2007 was 1.64 kg (currently estimated to be 3 kg), compared to 6.81 kg and 17.52 kg for Kenya and the Netherlands, respectively. This suggests a huge and untapped market potential for edible oil. There is a mixed public perception of millers' edible oil: although people like the taste and organic nature of the oil, particularly that of noug oil, the fact that the oil is extracted and stored in unhygienic conditions and is commonly adulterated has led to a high degree of contamination and health hazard. This, and some media advertisements, has created public havoc towards millers' oil.

Figure 3.4 Demographic size of the most populous countries



3.3.3 Technological and ecological factors

The milling industry depends on imported technology, mainly from India and China. There are indications that the technology and processes used by millers in Ethiopia are deteriorating. The recent devaluation and the government's strategy of domestic industry promotion have encouraged technology producers to invest in the future. For example, a new low-cost technology is currently being developed by Addis Ababa University in partnership with AAOMA, and MOTI and UNIDO are supporting the installation of a joint refinery. Both are expected to present new opportunities for the growth of small-scale millers. Further, increasing attention is being paid to technological innovations that use the by-products of oil millers - such as biofuel, cattle feed and fertiliser - and present opportunities.

On the other hand, most millers seem slow to adopt new technology and new ways of doing things, which hampers technology diffusion within the sector. Milling facilities are located in backyards and operated in single rooms, usually without proper waste management systems. Food safety requirements and increasing concerns about environmental issues mean that the millers' business is under threat. However, this could also be an opportunity, as it serves as driver of change for the more vibrant and innovative millers.

Table 3.1 provides a summary of the PESTLE factors highlighted above.

Table 3.1 Summary of the PESTLE factors	
<p>Political/legal:</p> <ul style="list-style-type: none"> - Weak legal enforcement (-) - New legislation prohibits selling crude oil (+/-) - GTP prioritising agro-processing industry (+) - Government target self-sufficiency in 2015 (+) - Government strategy small micro enterprises (+) - Donors' interest in the edible oil sector (+) 	<p>Economic:</p> <ul style="list-style-type: none"> - Fast growing economy (+) - Increasing FDI in agriculture (+) - Currency devaluation (+/-) - Duty-free import of palm oil (-) - Limited access to financial services (-)
<p>Social/Demographic:</p> <ul style="list-style-type: none"> - Large demographic size (+) - Attitude towards milling industry (+/-) - Media Pressure (-) 	<p>Technological/Ecological:</p> <ul style="list-style-type: none"> - Interventions to develop local technology (+) - High dependence on imported technology (-) - Slow adoption of new technology (-) - No proper waste disposal mechanism (-)

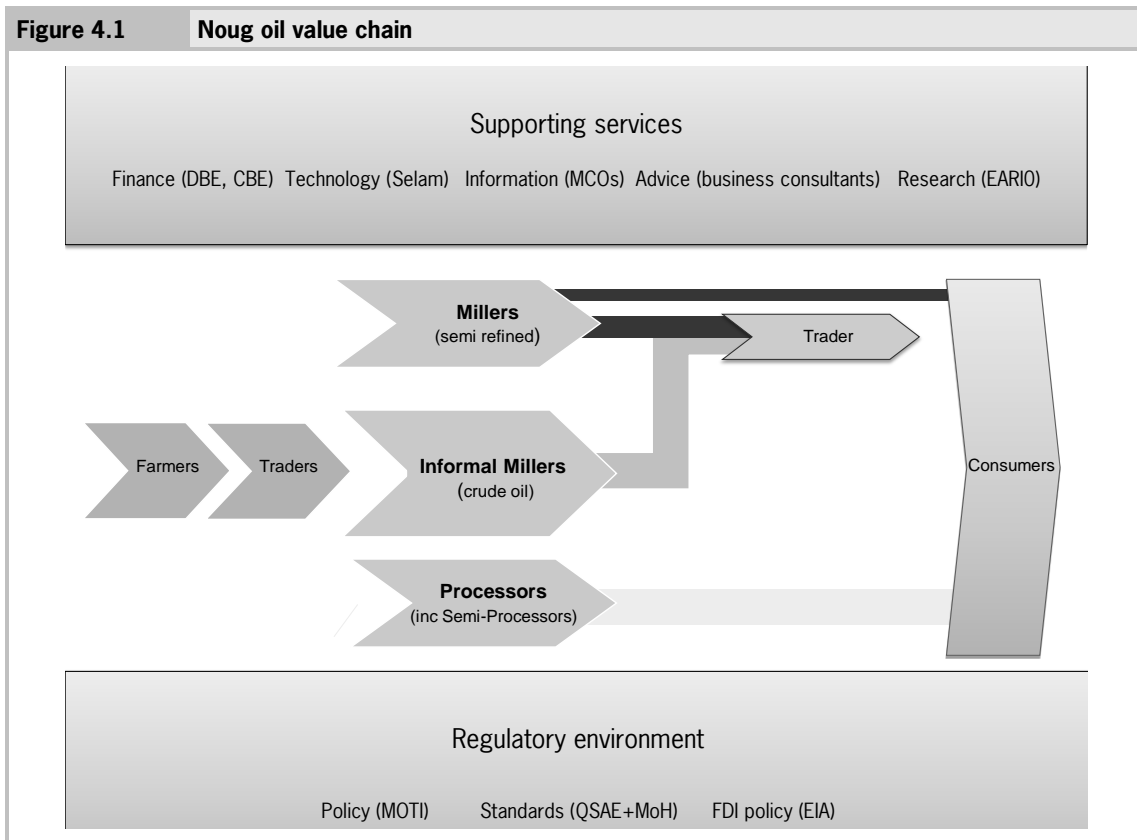
4 Identification of opportunities

This chapter deals with the results obtained during phases 0 and 1 of the BoP approach. Stage 0 identified and described the stakeholders in the value chain. Stage 1 focused on identifying constraints and potential business opportunities. Here, we describe the constraints that millers face in their business environment and identify three business models that could work under the new law. The pros and cons of each model are further discussed in Chapter 5.

4.1 Edible-oil value chain

A rough analysis of the noug value chain is presented in Figure 4.1. Noug is the most important oilseed used by small-scale millers. The following sections provide details about the key chain actors and the imperatives of the millers' environment.

Exact and consistent information about trade flows and markets shares is difficult to obtain. According to Ato Getachew, traders and consumers (households and B2B) are the principal buyers of millers' oil. Information gathered from the interviewed millers indicate that roughly 80% sell directly to consumers. However, a number of interviewed experts assume that for some millers the main sales channel is to traders. Particularly informal millers are believed to sell all their oil directly to traders. No noug oil miller reported a supplier-buyer relationship with processors, although such relationship do exist for cotton and rape oil.



4.2 Stage 0: actor identification

4.2.1 Farmers

Noug is primarily produced by small-scale farmers who apply minimal land preparation, inputs and chemicals (fertiliser, herbicides and pesticides) (Bulcha et al., 2002). According to the CSA, in 2009 there were 1.14 million farmers engaged in the production of noug, which covered an area of 0.3 million ha. Noug is the second most commercial crop (next to sesame), with more than 60% of production meant for market. Over the last five years, the production of noug increased by only 1.8%, while sesame increased by 87%. Production decreased between mid 2005 and mid 2006 (Figure 4.2). Primary evidence from the EIAR revealed that the decline is mainly attributable to the conversion of noug farms to other crops due to low levels of yield per ha for noug. The recent increase in export demand is the main reason for the increase in production since mid 2007.

Figure 4.2 Production of selected oilseeds in Ethiopia, 2005-2009 (in tonnes)

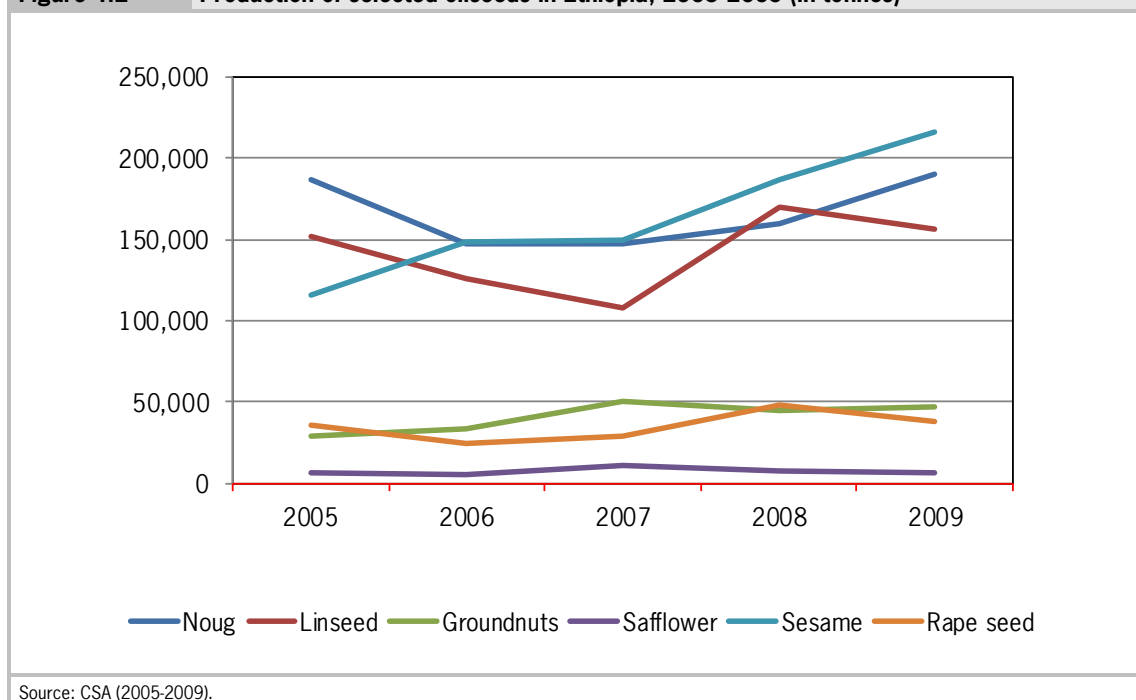


Table 4.1 provides an overview of the influence and contribution of various actors along the chain (based on an assessment by the research team). Farmers have high added value to the chain as they convert various inputs into outputs (oilseed), but in the marketplace their bargaining power is limited compared to brokers, wholesalers and exporters, who have key market resources, namely market intelligence and finance.

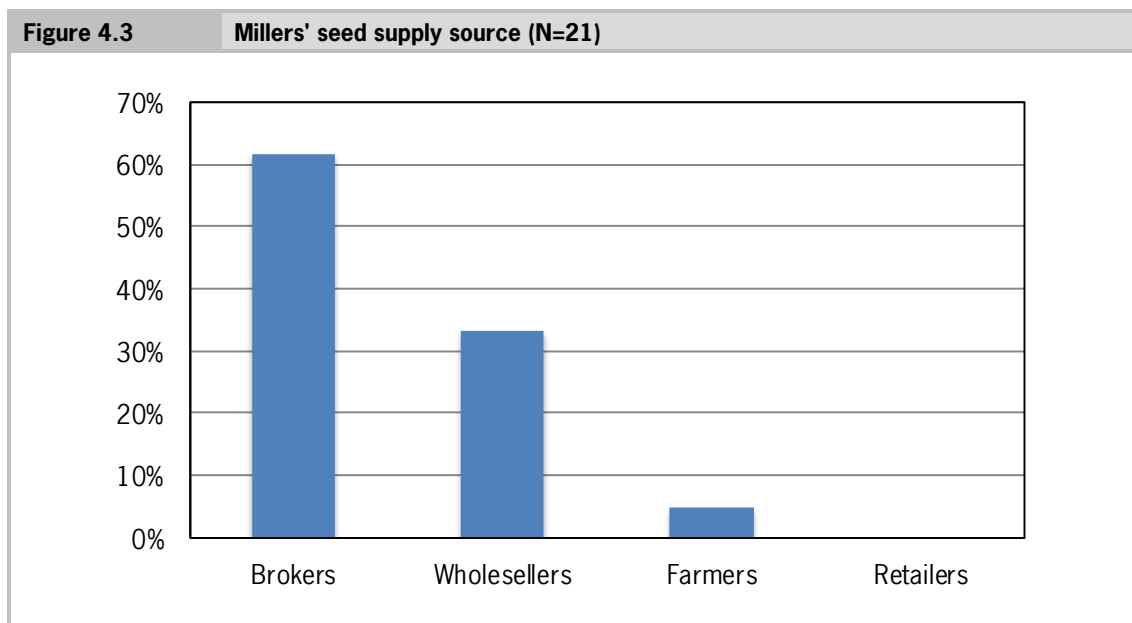
Table 4.1 Value addition and bargaining power of chain actors

Bargaining power	Value addition		
	low	medium	high
High	Brokers	Wholesalers	Exporters
Medium		Local Traders	Farmers
Low		Collectors	Millers

4.2.2 Traders and brokers

The traders' and brokers' chain extends from local to central markets (see chart below). Wijnands and colleagues (2009) indicated that farmers sell about one third of their grains (including oilseeds) directly to consumers (millers and processors), that 60% of the oilseeds are traded by 10% of the largest traders, and that 80% of the small traders have a share of 20%. The SNV (2006) estimated that 50 main traders and over 300 wholesalers are based in Addis Ababa, which is the major oilseed market.

Of the 21 millers interviewed, more than half stated that they buy from brokers and believe that brokers have strong power in determining market prices (Figure 4.3). Brokers also tend to dominate informal value chains.



4.2.3 Millers

Finding reliable data on millers is difficult because of the informality of the sector. The available estimates vary. The 2009 CSA industry surveys estimated that there are 259 small-scale and 33 medium and large-scale vegetable and animal oil producers in Ethiopia. According to Wijnands and colleagues (2009), in 2004/5 there were 860 edible oil producers (small, medium and large) (834 millers and 26 processors) with an estimated annual value of production equivalent to ETB 312.7 million (USD 18.4 million). Based on the interviews, the current number of millers (formal and informal) is likely to be around 1500. We estimate that half of the domestic edible oil is produced by formal millers (see Table 4.2).

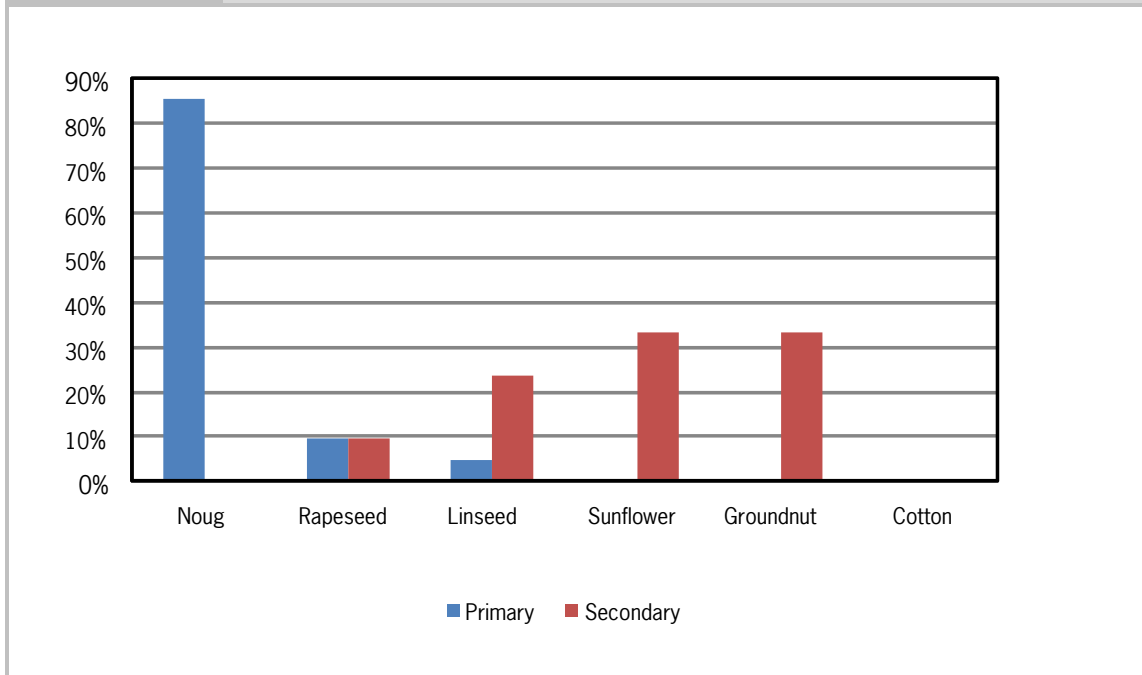
Table 4.2 Millers and processors

Producer category	Core product	Estimated share of domestic edible oil production	Principal buyer
Miller - formal	Noug/Sunflower/Groundnuts (C)	50%	Low/middle income
Miller- informal	Mixed (C)	17%	Low income
Processor	Cotton (R)	33%	High/middle income

(C)=Crude; (R)=Refined.

The majority of the millers interviewed extract noug oil (see Figure 4.4). However, this should not be overemphasised as millers commonly claim that they extract noug even though they use other oilseeds.

Figure 4.4 Major seeds crushed by millers (N=21)



The average number of employees reported by those surveyed was five; few are women. Most of the employees are family labour, and when there is hired labour, it is usually day labour. Of those interviewed, the large majority said that milling is their principle source of livelihood earning. However, industry specialists tend to assume that many millers have considerable other businesses. The reported average volume of oil extracted per day per miller is 1.3 tonnes. However, the quantity depends on the capacity of the miller. All those visited sell crude oil, mainly (about 80%) directly to consumers.

4.2.4 Processors

Wijnands and colleagues (2009) state that Ethiopia has a large number of local small-scale processors. The estimated annual domestic production ranges from 5,000 to 8,000 tonnes for the medium and large-scale enterprises. This production is estimated to be less than half of the full capacity. They use various oilseeds (e.g. palm, soy seed) as inputs.

4.2.5 Consumers

Price has, of course, a key influence on trade flows throughout the chain. However, the specific taste of noug is another important factor for consumer markets. This applies especially to crude and semi-refined noug oil (Wijnands et al., 2009). Table 4.3 provides an overview of the other relevant buying criteria besides price. This assessment is based on the observations and judgements of the research team.

Consumer category	Importance of buying criteria		
	taste	suitability for cooking	quality
Households	High	High	Moderate
B2B a)	Moderate	High	Moderate
Trader	Low	High	Low
Processors/Semi	Moderate	Low	High

a) B2B refers to hotels, restaurants and cafeterias that are doing business with low income groups.

4.3 Environment of millers

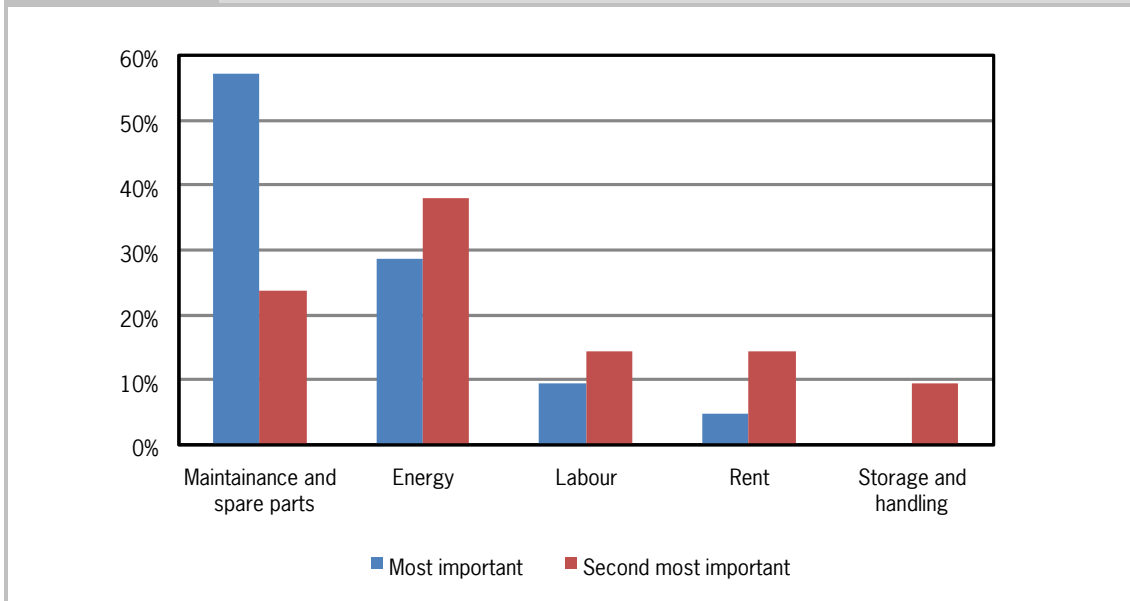
4.3.1 Supporting services

Supporting services that are crucial for business operations are, for example, financial, transport, technological and business development services (see Figure 4.1, upper grey area). Millers indicated that particularly a lack of credit, technology, training and advice limits the development and growth of their operations. A number of international organisations are providing immediate relief for these issues. UNIDO is financing a joint refinery facility for millers in the Amhara and Oromia regions as part of a new multi-UN agency programme (UNIDO, FAO and ILO). SNV is providing finance for the capacity building of selected processors and millers. Oxfam GB is supporting the establishment of a refinery in Gambella.

All millers surveyed indicated that they need additional working capital to take advantage of low prices during the harvest season. Investments are few. No miller uses bank loans. Most of the millers (two thirds of those interviewed) operate with leased facilities (a type of finance): cold pressing machines characterised by high wear and extremely high power consumption. A lack of collateral was mentioned as the main barrier to credit. However, a good number of millers have some form of fixed assets, such as residential houses or other business, that could be used as collateral. Overall, millers generally seem cautious about investing their assets and are not keen to invest.

Most, if not all, millers in Ethiopia use technologies (cold pressing machines) that are imported from China and India; they are primitive and characterised by high levels of wear and tear, power consumption and product loss. Discussions with millers indicated that, next to seeds, maintenance and spare parts are the most important costs (Figure 4.5). Local technology producers such as Selam Technology seem to have the capacity to manufacture at least the pressing machines. Overall, industry links are weak.

Figure 4.5 Most important costs for millers after seeds (N=21)



Besides finance and technology, millers indicated a need for capacity building in areas like good manufacturing practices, accounting, record keeping and business planning. The willingness to pay for such services seems low, as respondents frequently mentioned that such services should be provided by NGOs or the association, free of charge.

4.3.2 Regulatory environment

Recent changes in the regulatory environment of millers are an important force for change. Current problems revolve around quality control, price regulation and, again, technology. The government's new Growth and Transformation Plan re-emphasises the importance of agricultural in the country's overall growth and industrial development. The government strongly promotes agro-processing industries, such as edible oil. According to information from MOTI officials, the government is aiming to achieve self-sufficiency in edible oil by 2015.

More problematic here are the rules on quality inputs (seeds) and the enforcement (formal and informal) of those rules. Two thirds of the interviewed millers regard oilseed quality as a major problem. The respondents stated that up to 10% of what they purchase comprises impurities. Low quality is a result of export rejects, sand, poor harvesting and poor crushing practices (crushing without a carpet and an unclean ground). The average oil content of the seed as reported by the respondents is 29%, which is low compared to the content reported by the EIAR under a controlled environment (see Appendix 2). Another important dimension of seed quality mentioned by the millers is oil taste: although quantitative information is hard to find, millers reported that the oilseed sometimes has a bad smell and taste because of water absorption. The absence of a robust quality checking mechanism has increased the risk of such quality issues.

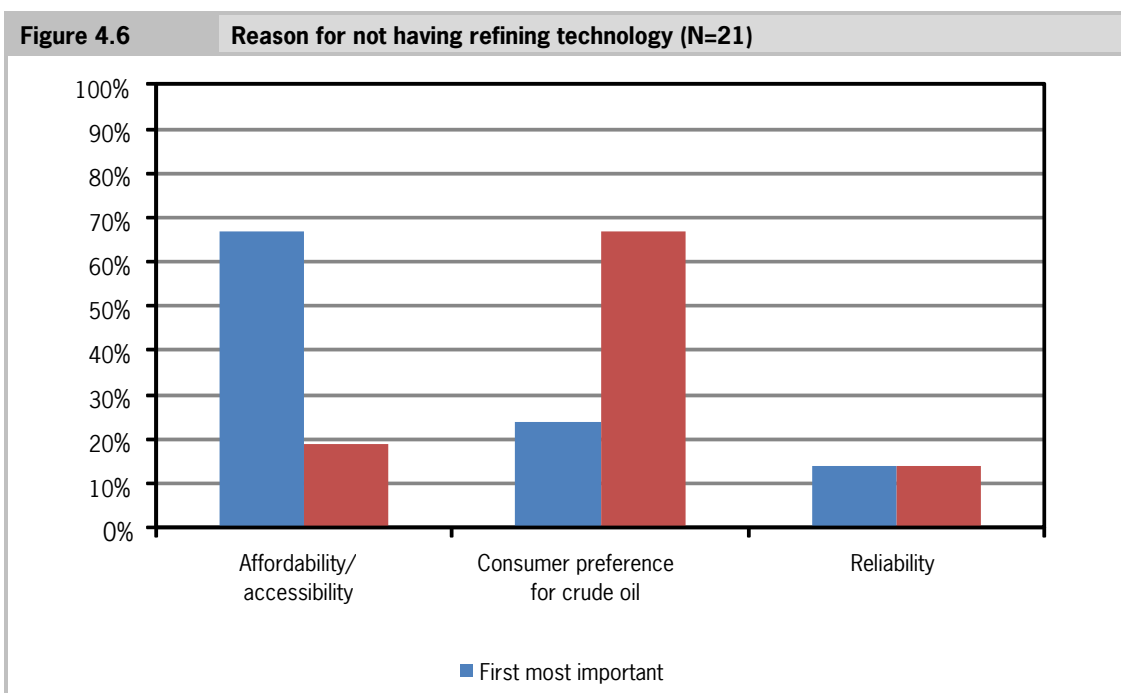
A quarter of the interviewed millers stated that price fluctuations and increases in seed prices are real problems. Table 4.4 shows noug prices from January to September 2010 in Addis Ababa and Bure Gojam. Variation can be up to 26% between the lowest price in April and the highest price in September in the Addis Ababa market (note the low dollar value in September and October; this is due to devaluation). The highest cross-sectional price difference between the two markets (Addis Ababa and Bure) is reported in August (see last column).

During the interviews, an attempt was made to understand the main reasons for the increasing and fluctuating prices. Supply shortage, increasing export demand and large numbers of brokers were mentioned by most of the millers and stakeholders.

Month	Wholesale price of noug seed in Addis Ababa	Wholesale price of noug seed in Bure-Gojam	Difference
	unit price (ETB)	unit price (ETB)	ETB
January	696	658	38
February	693	633	61
March	663	580	83
April	637	576	61
May	663	607	56
June	701	650	51
July	713	642	71
August	743	635	108
September	863	770	93

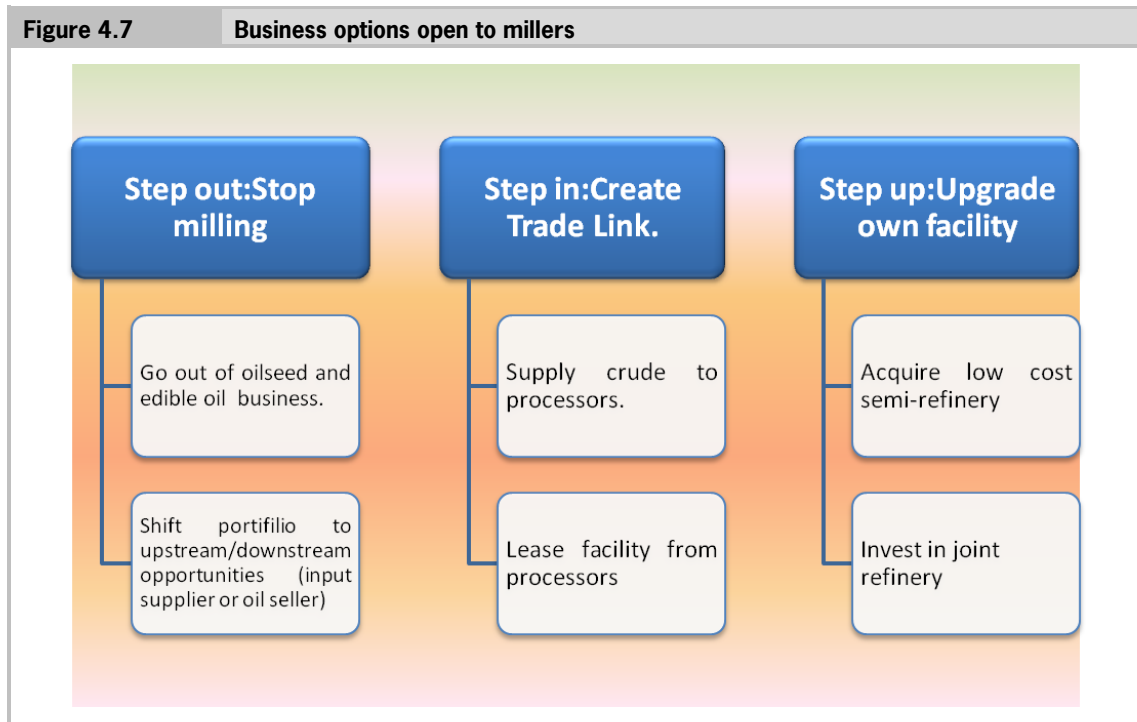
Source: EGTE (2010).

As discussed, technology and the quality of related equipment form another challenge. Many millers use non-food grade pipes and unclean tanks which easily corrode. The same room is often used for storing seeds, oil and by-products, and for cleaning and extraction. Further, there is no proper pilling, ventilation or lighting system. Containers or tanks are sometimes left open or are not properly sealed, thus exposing the oil to dust and pests. Most milling operations do not meet government standards. Although two of the respondents have semi-refinery technology, their oil does not meet the minimal quality standards of the national quality standard authority. The affordability of refining technology and consumers' preference for crude oil were frequently mentioned by the millers as barriers to adopting refining or semi-refining technologies (Figure 4.6). There are no government support mechanisms to enhance the affordability of technology.



4.4 Opportunities for millers

Due to the new regulation, millers will no longer be allowed to supply crude oil to the consumer market (i.e. to consumers or traders). Hence, their business models will need to be adapted. We see three options, which are shown in the chart below (Figure 4.7). We analyse the latter two options in more detail in the following chapter.



Based on the above analysis, stepping out of the milling business seems to present a missed opportunity for millers, consumers and the government. The domestic demand for noug oil will grow if the price remains competitive: it is a healthy, preferred consumer oil, incentivising the further development of a domestic competitive processing capacity that generates income for millers, processors, service providers and the government.

The step in model (creating trade links with processors) seems the most promising option of the two: the millers' willingness to invest seems limited, affordable good quality machinery is difficult to acquire and processors' current capacities are underutilised. However, millers have diverse preferences and realities and no single model will fit all millers. The step up option (investing in semi-refinery that meets the standards) is an alternative worth analysing, possibly serving a different, more rural consumer market.

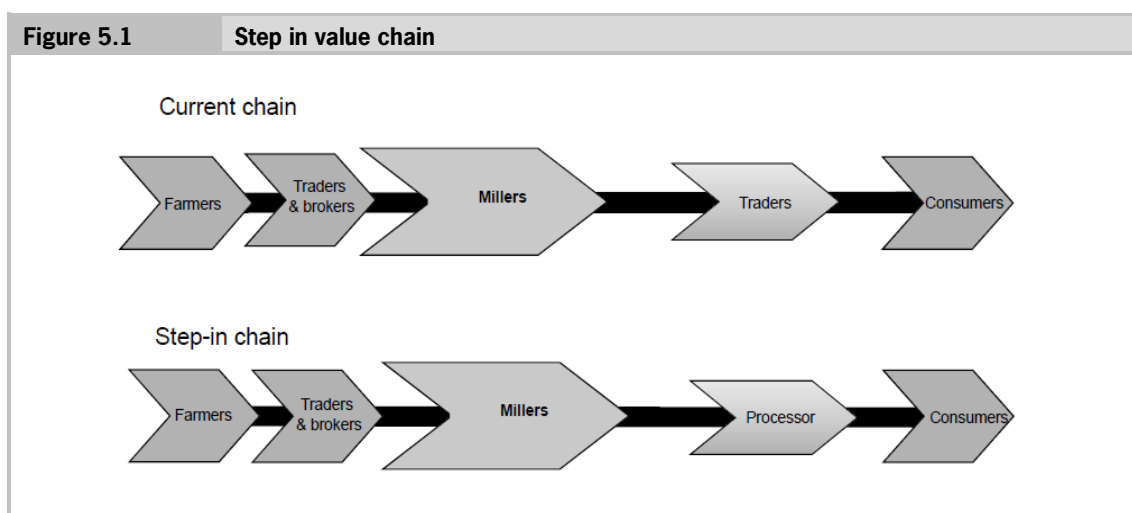
5 Setting the ground for new business models

In stage 2 of the BoP approach, the pro-poor innovation path was identified and the implementation path addressed. Using the product aspects affordability, acceptability, accessibility and availability (important in BoP markets), this chapter further discusses the viability of the step in and the step up model. It sets the way to discuss the implementation path: the actors that should be involved and their future roles and incentives. It is beyond this study to refine the implementation path further. Note that few insights were gained into the roles of traders, especially towards the consumer markets. The roles of traders are hence not highlighted in the discussion. Nonetheless, traders are likely to play important roles in current and future business models.

5.1 Step in: establish new trade links with processors

5.1.1 Assessing the step in model

Figure 5.1 gives a simplified overview of the current value chain and the chain adjustments that are related to the step in business model. In this model, a new trade link is established between millers and processors: instead of supplying the consumer market, millers supply crude oil to processors.



Affordability

Low-income consumers (BoP consumers) are the principal buyers of millers' oil, and thus affordability is critical. A marginal price increase could lead these consumers to switch to cheap imported substitutes (e.g. palm oil). The step in model has both positive and negative impacts on consumer price, both for millers and processors.

No additional investment in equipment and machinery means that the step in model might imply cost effectiveness for various chain actors. An explorative cost price estimate for small and medium-sized millers was drafted in order to analyse the economic effects of the alternative business options. Based on a reported average daily production of 1.3 tonnes, at the moment the cost price (including sales tax) is above the selling price. This is mainly due to the expensive input (noug seed); therefore, many millers mix noug seed with others seed (e.g. groundnut), which makes it possible to lower their costs. In addition, many millers do not pay tax on the oil they sell, which increases their margin.

For the step in business model, the cost price consists of the operational costs of producing crude oil (sieving, crushing and pressing). Also the depreciation cost, allocated on a daily production of 1.3 tonnes,

has been included. The effects on the cost price due to the adaption of the step in business model is limited. Only additional costs for the transport of the crude oil to the processors will have to be included. However, at the moment this is difficult to estimate and will largely depend on the physical distance between miller and processor.

Processors are currently operating at less than 40% of their capacity and have a strong demand for crude oil supply. By refining more crude oil from millers, processors will benefit from improved efficiency (i.e. economies of scale and reduced cost). This will create room for price reduction and consequently improve the market affordability of noug oil.

On the downside, it is evident that the fixed cost base (machinery, labour, administration and lease) of processors is higher than that of millers, implying a risk of price increase on the end product.

Most processors extract and refine cotton oil and have a single (versatile) processing line. The introduction of noug into the processing line will bring additional costs for processors, as the extraction of noug oil is an additional process.

Acceptability

Noug and noug products have a big market potential. There is strong consumer-product emotional attachment and noug oil is traditionally the most preferred oil amongst Ethiopian households. It is also used for medical and ritual purposes. Further, roasted noug is served during festivities.

Aside from the market potential, the step in model avails the opportunity to pack and label the oil, as some of the processors have that capacity. This would improve the safety, durability and mobility of the oil, and hence increase its acceptability by end consumers. However, it is worth mentioning that the packaging and labelling should be as lean as possible (minimum cost). Generally, the step in model is highly favoured by the sector association leaders.

Critical to the functioning of the step in model is the need to build trust and a fair incentive system between millers and processors. The research team encountered a high degree of rivalry between millers and processors: some processors think that millers are operating illegally and should be closed down, while millers feel that trade deals with processors can be difficult, as the latter try to take unfair advantage of them. Besides, some of the processors such as Addis Mojo are ISO certified and hence require good manufacturing practices from their suppliers. As it stands now, not many millers would meet such standards, nor will they be able to in the near future. As stated, taste is the main reason for the high consumer demand for crude noug oil, and as the oil may lose its conventional taste when refined, this could lead consumers to temporarily switch to imported substitutes, such as palm oil (the same applies to the step up model).

Accessibility

The step in business model has both positive and negative aspects with respect to the consumer's access to noug oil. Consumers (low-income group) are the principal customers of small-scale millers. Millers are widely spread in small and bigger cities, and are thus near to consumers, and often sell crude oil without packaging, as clients bring their own bottles. This makes the edible oil easily accessible to many (potential) consumers. If millers supply processors, consumers will be forced to buy elsewhere, and in most cities and towns there are only one or two processors. Packaging will also influence the price. The transaction costs for consumers are likely to increase.

On the other hand, the presence of processors in every city and town indicates that the step in approach could be widely adopted. Except for the few that are located deep inside the slums, milling facilities have access to road infrastructure, implying that the crude can easily be transported from the miller to the processor site.

However, as found during the field interviews, processors expect a minimum volume per day of 50 tonnes from each miller, which seems unrealistic given that they currently produce only 1.3 tonnes a day.

Another factor influencing accessibility is sustained input supply. As discussed in section 3.3, farmers in some nearby noug growing areas are converting their farms to other crops. Noug production is being pushed to peripheral areas, making access to input even more difficult.

Availability

Consumer demand for noug oil exceeds supply, despite the high price. There is hence a strong downstream demand for crude noug oil from processors. Processors' low capacity utilisation is mainly attributed to a lack of input supply. The step in approach seems to present a win-win scenario for both millers and processors. It should be noted, however, that during the peak season (harvest season) processors operate at full capacity, which means that their interest in millers is in the off season. A lack of a year-round noug seed supply is equally critical for millers. Evidence from the AAOMA indicates that millers are currently utilising less than one third of their capacity, mainly because of issues related to input supply.

The chart below provides a summary of the pros and cons of the step in model.

Table 5.1 Analyses of the step in model	
<p>Affordability:</p> <ul style="list-style-type: none"> - No additional investment in new machinery (+) - Increasing capacity utilisation of processors could lead to higher efficiencies (+) - High overhead of processors could inflate price of refined noug oil (-) - Most processors are specialised in cotton oil; processing noug could imply a switching cost (-) 	<p>Acceptability:</p> <ul style="list-style-type: none"> - Strong consumer-product emotional attachment (+) - Room to augment product with packaging: increases durability and reduces risk of contamination (+) - Push factors from sector association (+) - High degree of rivalry between processors and millers that can stimulate innovation (+) - Oil may lose characteristic taste when refined (-) - Some processors (e.g. Addis Mojo) are ISO certified and expect good manufacturing practices (-)
<p>Accessibility:</p> <ul style="list-style-type: none"> - Millers are located in major towns where there are consumers (demand) and processors (i.e. can have access to refining facilities) (+) - Some processors have minimum volume requirement (-) - Lack of trust between millers and processors, which might prevent millers and processors from doing business (-) - Noug producers are converting to other crops (-) 	<p>Availability:</p> <ul style="list-style-type: none"> - Processors have idle capacity (average capacity utilisation is less than 40%) (+) - Idle capacity may not be available during peak season (-) - Lack of year-round availability of noug seed (-)

5.1.2 Setting the ground for the step in model

In Chapter 4, we described the main actors in the edible-oil value chain. New trade links between millers and processors seems to be a win-win strategy for both parties. However, it is evident that such potential supplier-buyer relationship is surrounded by complexities. In this section, we analyse the various roles that various actors would have to perform in order to implement the indicated business models successfully.

Actors

Price fluctuation and price increase due to increasing demand for export, supply shortage and the power of middlemen were mentioned as major challenges to millers. For the step in business model, these problems should be addressed. Thus, we recommend millers to improve production by working with farmers or farmers' organisations in order to create sustainable relations with input suppliers. Millers might even invest in farmers to enhance the current productivity and improve seed quality at the farm level.

Millers also need to develop new market channels with processors. In order to overcome the high degree of rivalry between millers and processors, they could organise forums where millers and processors come together and exchange ideas in order to create new business. As most processors are not using their maximum capacity, they could reorganise themselves and use existing machinery to process

noug. They could also organise themselves into cooperatives and facilitate shared storage space to take advantage of low prices during post-harvest as well as to overcome the challenge posed by middlemen.

Supporting services

There could be an important role for advisory services. They could train farmers' organisations in the potential win-win situation from trading directly with millers and processors and in the advantages of trust and long-term supplier-buyer relationships. They could also train farmers/farmers' organisations and other chain actors in product handling and the risks of adulteration. A further promotion of the supporting services such as technical advice, price information and business development services could enable a strategic partnership between millers and processors.

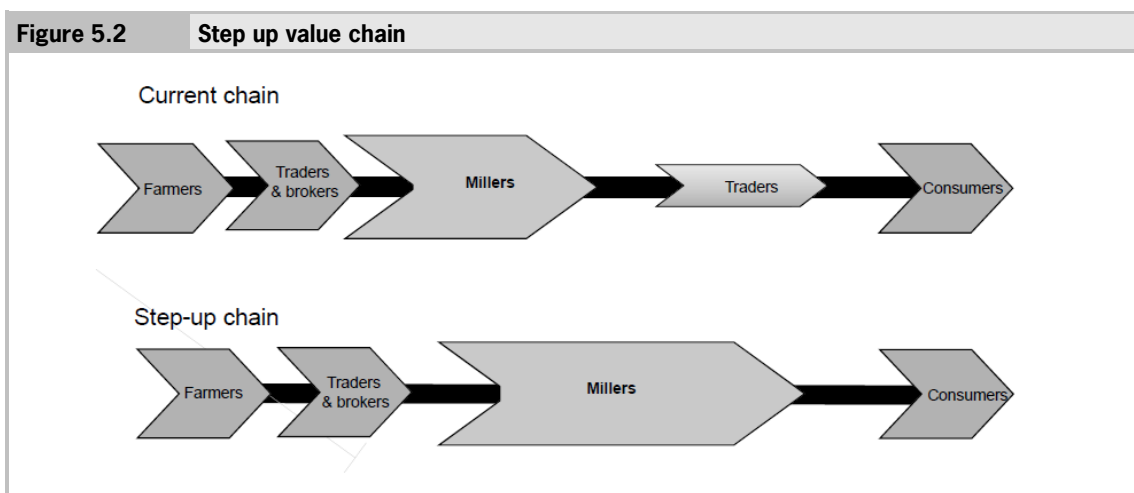
Regulatory environment

Standards on quality are essential. The regulatory bodies for law enforcement (like QSAE and MoH) need capacity strengthening in order to increase the enforcement on quality standards. Incentives should also be developed to support the domestic edible oil industry and counterbalance oil imports.

5.2 Step up: upgrade existing facilities

5.2.1 Assessing the step up model

In the step up model, millers produce semi-refined oil and supply consumers directly. By upgrading their facilities, they would be able to deliver edible oil according to the quality standards set by the Ethiopian government. Note that upgrading can imply various strategies like individual or collective investments, but refers to a redesign of the processing process so that millers produce semi-refined oil that meets government quality standards. Figure 5.2 gives a simplified overview of the step up value chain.



Affordability

Affordability is critical: a small price increase can change consumers' preferences towards cheap imported substitutes like palm oil. Compared to the step in model, expected consumer price increases are likely to be less. Millers generally operate under lower cost structures, using cheaper technologies, labour and administration systems. Further, there are no switching or transport costs of refining for millers, as in the case of the step in model.

To produce semi-refined quality oil, millers will need to invest in their technologies, as current production techniques do not comply with the standards of QSAE. In the absence of reliable domestic technology, millers need imported refining technologies. This could be far more costly compared to the step in

model. However, new processing technologies are being explored by Addis Ababa University. Accelerated development and commercial exploitation of these technologies would be instrumental in making low-cost technologies available. Appendix 5 gives an overview of the explorative results of the effects on the cost price. For the step up model, additional investment in machinery has been included. However, this technology is still under development and the impact on the cost price is therefore difficult to estimate. Nevertheless, according to the explorative results, the actual effects of adopting semi-refined technology lie in higher depreciation costs and an increase in operational costs.

Acceptability

As stated, there is a strong consumer-product emotional attachment and there is a big consumer demand for noug products. By investing in refining technology, the step up model makes it possible for millers to continue supplying their principal buyers (consumers) with an increased quality level according to the requirements set by the Ethiopian government.

There are indications that government supports the step up model, provided the new technologies are to be produced domestically, which fits with the overall strategy of domestic industry promotion. The Ministry of Trade and Industry, together with UNIDO, is supporting the establishment of a domestically designed (not yet produced) refinery in the Amhara and Oromia regions. This approach is also preferred by a group of millers who are not members of the association.

The rivalry between millers and processors and the strong bargaining power of processors were issues frequently mentioned by members of the association. This suggests a preference for the step up model. However, introducing additional machinery will add to the existing problem of under-capacity utilisation, perpetuating the chronic shortage of inputs.

Accessibility

To keep edible oil easily accessible to consumers, the step up model has an advantage over the step in model. In the latter model, consumers are forced to buy oil at other locations (processor or shops). By investing in refining technology, millers will be able to maintain a supply to their regular customers and thus ensure food safety.

However, the strategy of upgrading existing facilities is not feasible for the majority of millers due to a lack of finance. On the other hand, upgrading could spur the development of low-cost technologies. A number of millers are located in remote areas with no access to refining facilities. In this regard, the step up model provides a better solution than the step in model. Besides, this option does not need a minimum volume requirement, as in the case of the previous one. The other problem mentioned in relation to the step in model - access to inputs - remains a challenge in the step up model too. Overall, despite room for scalability and adaptability, the step up option seems limited because of its capital requirement and the absence of certified technology as of now.

Availability

Availability of input, as discussed in the step in approach, also remains a challenge. This somehow cements the idea that bringing additional machinery into the midst of a chronic input shortage is not an appropriate decision. There is currently no certified small-scale refining technology. Importing such a technology could be an option, but would be expensive. The option of installing a joint refinery by a cluster of millers organised into cooperatives has been proposed by the AAOMA. However, this would also need additional investment while the existing refineries are not optimally utilised.

Table 5.2 provides a summary of the pros and cons of the step up model.

Table 5.2 Analyses of the step up model	
<p>Affordability:</p> <ul style="list-style-type: none"> - Need for additional investment in new machinery (-) - Possibility to adopt small-scale, low-cost refineries such as boilers (+) - Low refining overhead compared to step in; no sophisticated machinery or administration cost of refining (+) 	<p>Acceptability:</p> <ul style="list-style-type: none"> - Strong product-consumer emotional attachment (+) - Ministry of Trade and Industry and UNIDO support this option (+) - Frequent input supply shortage means that bringing in additional refinery capacity adds to the underutilisation (-)
<p>Accessibility:</p> <ul style="list-style-type: none"> - Most millers lack finance (-) - Could fit all millers, viz. including those in remote areas (+) - Possibility for small-scale affordable technology (+) 	<p>Availability:</p> <ul style="list-style-type: none"> - No dependence on processors (+) - No refining technology (-) - Lack of year-round availability of noug seed (-)

5.2.2 Setting the ground for the step up model

Actors

For the actors in the edible oil value chain, the step up model implies a more or less identical role. It is important for millers to invest in farmers and to create sustainable relations with suppliers in order to receive sufficient quantities of good quality seed. Millers also need to invest in new technology so that they can produce semi-refined oil.

Supporting services

Advisory services play an important role. Awareness of food safety and hygiene should be created. They should also train farmers/farmers' organisations and other chain actors in product handling and the risks of adulteration.

A lack of technology is a major challenge faced by the millers. Technology companies and research should facilitate cross-industry links with technology producers such as Selam Technology, Akaki Metallurgies, and assess the feasibility of the local production of the cold pressing machines and spare parts.

Financial institutes could facilitate access to credit services for millers with limited financial capacity/ fixed assets by providing loan guarantee to invest in new technologies. In addition, existing small-scale technologies including semi-refining could be facilitated by bank guarantees for millers that have limited financial capacity, in order to get access to simple harvesting technologies/crushers.

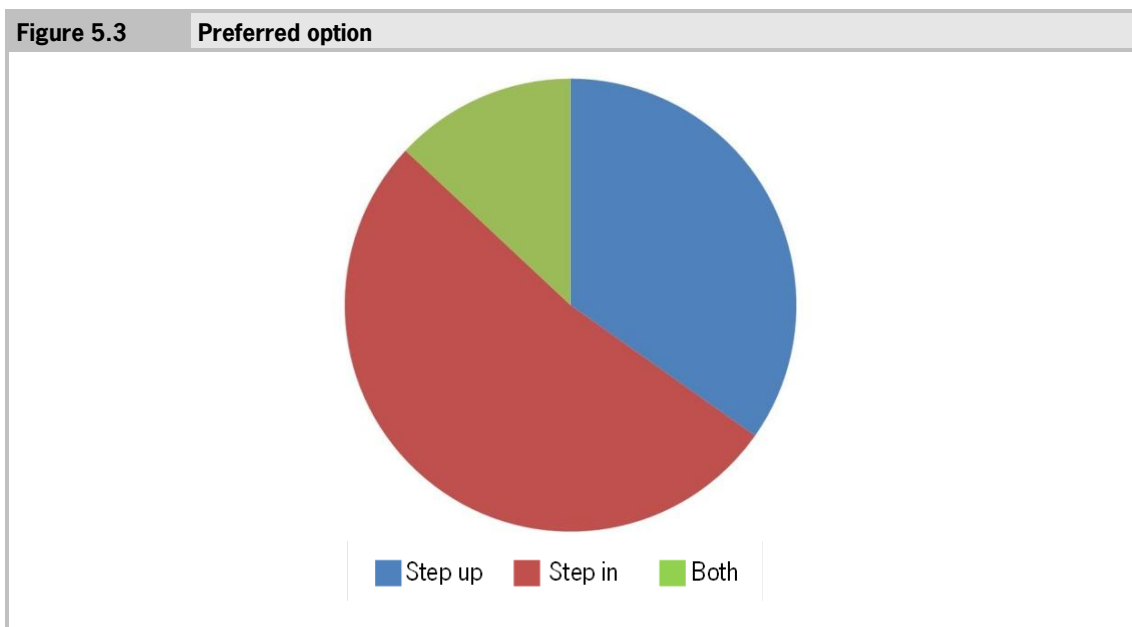
Also in the step up scenario, MCO could provide reliable information about regulations and market opportunities. A transparent pricing system that is reasonable to processors and millers should be facilitated.

Regulatory environment

Besides the regulatory issues mentioned in the step in discussion (quality and overall domestic industry support), the step up model requires additional support for the development of the processing infrastructure (hard and software).

5.3 Validation of the models

The workshop to validate these models was well attended (over 40 participants; see Appendix 4) and was considered timely and highly informative. The willingness to invest in new business is strong. No single option suits all millers (see Figure 5.3), as business strategies are inherently different.



The underutilisation of existing refining capacity (refining capacity utilisation is less than 40%) and the strong demand for crude oil provides opportunities for trade links (step in) with processors. Although levels of trust are low, this could be a win-win for both processors and millers. The benefits for millers are:

- no need for additional investments in machinery;
- it creates room for improved product safety and durability through packaging and labelling;
- it paves the way for knowledge transfer from processors to millers.

A strong preference was also expressed for the step up option. A good number of millers prefer to be independent and seem to be reluctant to cooperate with processors. In addition, small-scale millers might be able to serve a rural, low-income market that cannot be served by larger processors. The availability of low-cost technologies was believed to be key for this model to work.

There are some cross-cutting systemic issues that have to be addressed either way. The most obvious being quality standards related to inputs and hygiene: both need to be further developed, promoted (good manufacturing practices) and rewarded. Nonetheless, to make the transition to a new business model, millers need support - perhaps financial but certainly technical - that will temporarily reduce their investment risks. Each model requires a different set of actions from the various market players (Table 5.3).

Table 5.3 Overview of actors and required actions in the new business models			
Actors		Required actions	
Role	Agent	Step in	Step up
Value chain actors			
milling	millers	trade link with farmers	similar
		adjust price	similar
		adjust volume	similar
		create new market channel to processors	invest in technology
processing	processors	adjust capacity/machinery	redefine market position
		adjust process	
producing	farmers	improve farming practices	similar
trading	trader - from miller to consumer	redefine service	similar
	trader - from farmer to miller	improve service quality	similar
Supporting services			
advice	extension service	knowledge and demonstration to farmers	similar
information	millers cooperatives/associations (PPO, etcetera)	information about regulations and market opportunities	similar
finance	DBE and CBE	Develop loan portfolio for millers and farmers	Similar
research	EARIO	adapt research to market demands	similar + co-invest in new pro-poor technology
technology	Selam	develop spare parts for existing milling machinery or develop new milling machines	similar + invest in small-scale and affordable refining technologies
policy	MOTI	implement incentives for domestic edible oilseed production	similar + support technology infrastructure
standardisation	QSAE and MoH	increase enforcement of quality standards for seeds	similar
foreign direct investment	EIA	implement incentives for domestic edible oilseed production	similar

Although the workshop could not discuss this in too much detail, clear interest was expressed in the alternative business models. Additional (market) information and support is needed by the participants (Appendix 4). According to the participants, transparency within the noug value chain is required in order to have a stable input supply of noug seed. The quality of noug seed is variable and farmers and traders should provide a stable quality level. The demand for noug seed on the export market and the tax-free import of substitute oils (e.g. palm oil) are also regarded as important issues. Furthermore, there is a strong need for skill development and training of millers in order to improve the level of processing, storage and handling.

6 Conclusions and recommendations

6.1 Conclusions

The Ethiopian oilseeds sector shows strong growth, and thus contributes to employment and the economic growth of the country. Oilseed is the second most important export crop and competes with domestic edible oil chains. The Ethiopian government is aiming to achieve self-sufficiency in edible oil by 2015 (import substitution). Hence, policy will favour the domestic market, in addition to supporting high-value exports.

Small-scale millers, which currently supply more than 60% of the domestic oil, have an important role to play. As from next year, the government is banning the sale of crude oil in order to ensure food safety standards. This new law will force millers to change the milling process. Millers predominantly mill noug seeds, a preferred but expensive oil. The current milling operations are characterised by outdated technology, weak market linkages and risk-averse investment behaviour. Changes will have to be made to the materials in the value chain itself as well as in its environment. The key actors in the value chain are farmers, traders and brokers, millers, processors, and consumers. The environment consists of service providers and regulatory institutions.

The Ethiopian edible oil industry is characterised by a lack of reliable, consistent micro data. However, we have developed three business models: the step out, the step in and the step up model. We recommend supporting the development of both the step in and the step up model. This view was strongly validated at a workshop with millers and other stakeholders. The urgent need for change was present among participants, and these models present workable options for the very near future. This research has provided a first indication of actors and action plans for both models; follow-up activities should expand upon this.

6.2 Discussion and agenda for implementation

The goal of this research was to explore the opportunities within the small-scale oil factories sector to produce quality oil at competitive prices. This was done by using the BoP innovation cycle as an inspiration model better to identify the needs, opportunities and constraints for local and innovative business models and to work towards establishing a co-creation and co-innovation process to develop and introduce the required solution and involving relevant market players in the process.

This was initially considered innovative as it focused on the millers and adopted a BoP approach. Few studies highlight the challenges faced by and the opportunities open to millers, despite the latter's importance in the edible-oil value chain. The BoP approach is an emerging one. There are high expectations from public and private stakeholders, but little practical experience. The activities during the various BoP stages are still black boxes that require further exploration. As a result, this research was explorative in defining the actions required to develop stages 0 and 1 of the BoP innovation cycle. The findings of this research were validated at a workshop in Addis Ababa in March 2010. The approach as such was explicitly seen as innovative, useful and informative.

The research has generated many insights into an upcoming industry that is characterised by informality and an urban-rural disparity. However, as the research was limited, the conclusions are only indicative. A more thorough analysis should generate:

- a. Representative country-wide information about millers and other actors, such as traders and processors;

- b. Economic investment analysis of the costs and benefits of the business models, since the current technology is still under development or explorative.

This requires a more precise understanding of the actions and investments required of the various actors. This information is needed in order to proceed with step 2 of the BoP approach, namely to set out on the pro-poor innovation paths in close collaboration with the various stakeholders.

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Appendix 1

Quality standard requirements for edible oils

Type of edible oil	Acid value, max mg KOH/g	Saponification value, mg KOH/g	Iodine value (wijis) g/100g	Unsaponifiable matter max. %	Peroxide value, max. me peroxide oxygen/kg	Processing requirement
Rapeseed	0.6	168-181	94-120	2	10	Refined
Maize	0.6	187-195	103-128	2.8	10	Refined
Sesame seed	0.6	187-195	104-120	2	10	Refined
Groundnut	0.6	187-196	80-106	1	10	Semi-refined
Sunflower	0.6	188-194	110-143	1.5	10	Semi-refined
Linseed	0.6	188-195	175	1.5	10	Refined
Cotton seed	0.6	189-198	99-119	1.5	10	Refined
Noug seed	0.6	188-192	128-134	1.5	10	Semi-refined

Source: QSAE (1990: V7).

Appendix 2

Summary of agronomic noug genotypes

Noug Genotype	Days to		Seed yield (kg/ha)	Oil content (%)	Oil yield (kg/ha)
	flower	mature			
PGRC/E 15067	100	142	876	39.4	340
PGRC/E 15203	100	144	855	38.8	318
PGRC/E 15558	99	141	782	39.1	291
PGRC/E 15611	101	143	867	39.6	333
PGRC/E 15678	102	144	894	39.2	338
PGRC/E 208377	104	144	892	40.1	345
PGRC/E 208937	103	145	920	39.6	351
PGRC/E 228421	105	145	879	39.8	330
PGRC/E 228423	102	144	947	39.3	372
PGRC/E 228684	101	143	940	39.5	354
Kuyu	102	145	826	39.4	325

Source: EIAR (2005, unpublished).

Appendix 3

Respondents

Type	Sub City	Location	No employees	Ownership	Association Member	Gender
Miller	Addis Ketema	Kebele	3	Private	Yes	M
Miller	Arada	Yohannes	3	Private	Yes	M
Miller	Around Addis	Burayu	3	Private	No	M
Miller	Around Addis	Sebeta	4	Private	Yes	M
Miller	Around Addis	Burayu	4	Private	No	M
Miller	Around Addis	Burayu	3	Private	No	M
Miller	Around Addis	Burayu	3	Private	No	M
Miller	CMS	Meri	4	Private	Yes	M
Miller	Gulele	Kechene	2	Private	Yes	M
Miller	Gulele	Kechene	2	Private	Yes	M
Miller	Kirkos	Kirkos Church	4	Private	No	F
Miller	Kirkos	Kirkos Church	5	Private	No	F
Miller	Kolfe	Mazoria	3	Private	No	M
Miller	Kolfe	Mazoria	6	Private	No	M
Miller	Nifas Silk Lafto	Hana Mariam	5	Private	Yes	M
Miller	Nifas Silk Lafto	Biheresige	4	Private	Yes	M
Miller	Yeka	Kotebe	5	Private	No	M
Miller	Yeka	Abware	12	Private	No	F
Miller	Gulele	Wereda	8	Private	Yes	M
Miller	Nifas Silk Lafto	Sarbet	7	Private	Yes	M
Processor	Nifas Silk Lafto	Gotera	50	Private	Yes	M
Supermarket	Bole	Bole Road	20	Private	N/A	M
Supermarket	Bole	Bambis	15	Private	N/A	M
Supermarket	Nifas Silk Lafto	Sarbet	12	Private	N/A	M

Appendix 4

Results of workshop

Addis Ababa, 18 March 2011

1. Opening, objective and welcome

Dereje Chanie (programme coordinator Ethio-Dutch Private Partnership on Oilseeds).

The objectives of the workshop are to validate and evaluate the finding of the projects. Getting feedback on the proposed business models. Creating commitment for further steps.

2. Presentations

Presentation of government (Ato Zergaw)

General strategies of the government with the focus on agriculture. The Growth and Transformation for the five years. Some objectives are to reduce poverty, reduce dependence on import and increase export strength.

The presentation gave an insight into the government's five-year plan with respect to the agro-processing industry and especially edible oil. Incentives are created in order to stimulate investments in the sector. Furthermore there is a need to strengthen the competitiveness by increasing competition within the sector in order to enhance entrepreneurship and reduce costs. The quality level is very important and a reduction of the quality standards of edible oil will not be accepted.

Many question were raised. Some questions were related to the number of edible oil factories and where they are located based on the governmental objective of increasing the edible oil sector. Another question was related to the input of noug for the domestic edible oil industry versus the export. It is better to use noug for edible oil than for bird seed (export). The tax exemption on palm oil is an important issue and it harmonised the domestic noug oil production since palm oil is a substitute for noug oil. The low productivity of noug was also mentioned. The noug breeder stated that he has various new varieties under development.

Presentation of alternative business models (Yared Sertse)

The key findings of last year were presented. These are related to the external environment, the various actors in the value chain and the business options. This gave a good overview of the current situation in the sector. The role of the brokers is questioned, and according to the millers this increases the price of the input and leads to the noug seed being mixed with other inputs (sand). Somebody mentioned the need for a trading house that will create more transparency. The various alternative business options are recognisable. However, the option to set up trade links between millers and processors is not regarded as an alternative (step in). Millers prefer to supply consumers and are very interested in alternative, low-cost technologies in order to remain independent. The other option (step in) is related to a lack of trust in big processors, the inability to comply with requirement set by processors (quality, volume) and transport.

Participants appreciated the distinctive focus of this research, namely small-scale millers rather than bigger firms. Furthermore, the timing is considered good due the actual enforcement by the government.

Presentation by Addis Ababa University (Shiferaw)

The presentation of the explorative results on fully refined technology for the edible oil industry was very valuable and appreciated by the participants. The process of refining was also interesting and created a lot of discussion. However, the presentation did not give enough detail about the exact technology or

insights into the feasibility. The price estimation of the investment is considered high. Certain elements of the refining technology could be adapted separately. Price might drop in the future since the project is still explorative and sources for separate parts of the technology still have to be determined. This can be from domestic production, import or combinations by assembling. After the research, an independent party should commercialise the machinery after it has been patented by Addis Ababa University.

3. Future demand sector

Enforcement, input and technology are the main issues within the sector. A lack of sufficient seed supply makes it hard to produce oil, and the long value chain increases price and might decrease quality. Technology required to comply with governmental standards is lacking. As a result, there was a lively discussion on the production of virgin oil versus refined oil. According to international standards, virgin oil can be exported; however, in Ethiopia this is not allowed. Due to the current machinery a healthy production of edible oil cannot be guaranteed. Within this study we comply with the Ethiopian standards.

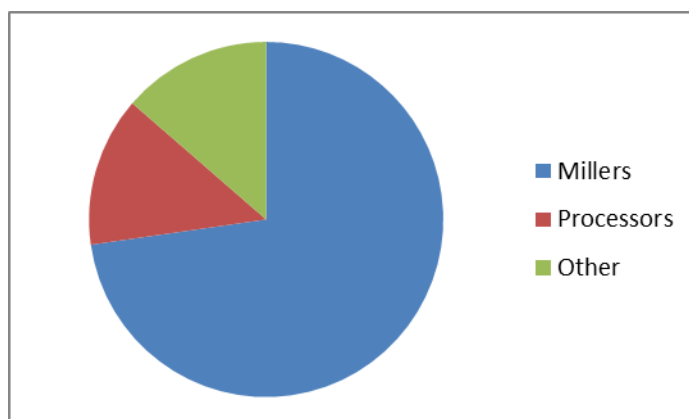
Some millers have already installed some sort of semi-refined technology, however they mention an increase in cost price and are therefore not able to compete with millers that sell crude oil. Unfair competition due to a lack of enforcement creates tension.

Stepping in is not an option that is welcomed by most millers (see survey results). They are interested in hearing about new technologies that can be bought at a low cost. However, the cost and the scale of these technologies are not clear yet, therefore any cost calculation is difficult. Also the return on investment (ROI) should be addressed.

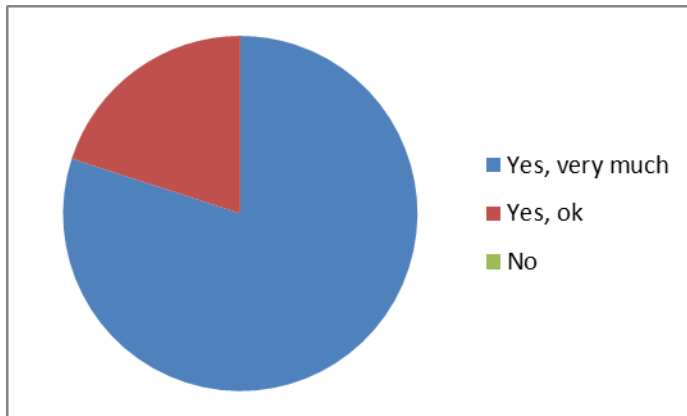
A code of conduct (or good manufacturing practices) was mentioned various times during the workshop. In order to work with products for human consumption, the level of hygiene at the small-scale factories needs to increase. A standard (e.g. HACCP) could help millers to improve handling, processing and storage.

Survey results

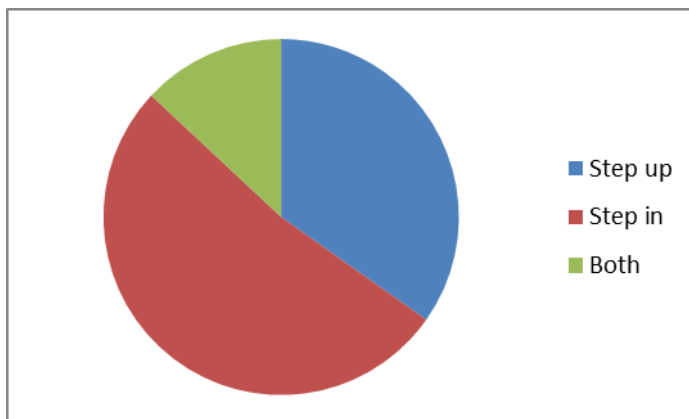
1. Are you a miller, processor or 'other'?



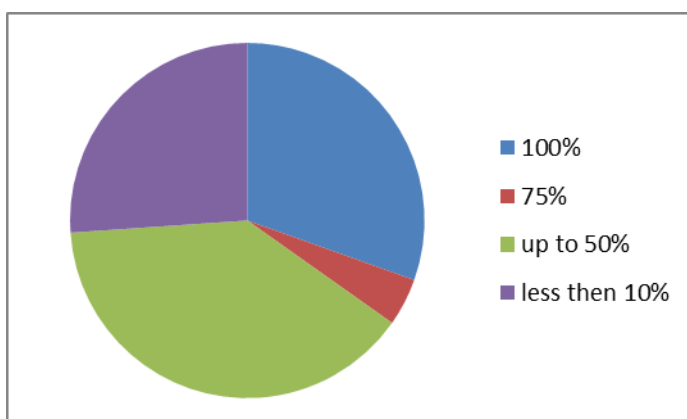
2. Was the information useful?



3. Which option is the most attractive?



4. What share of all small-scale millers will invest in new business models (change current practice)?



5. What information that is currently not available do you need to make business decisions?

Input supply	Production	Market
Linkage with unions/cooperatives, trading houses	Electricity, working capital, refinery	Packaging
Information about input supply	Information about spare parts and production equipment	Market competitiveness
Direct link with seed producers, trading place, stable productivity (oil content)	Semi-refining and refining processes	ISO certification
Input supply	Refining/semi-refining technology	Price that reflects cost of seed
Input supply	Forum between QSAE and edible oil producers	Short chain link
Daily price of input, direct link with producers	Skilled labour	Consistency in market
Quality of input	Consistent processing	Market stabilisation
Input supply	Exporting cold press oil	Stable market
Quality oilseed, importing seed	Good manufacturing practices	Working capital, linkage with farmers' organisation
Input supply and quality	Technology promotion and Access to finance	Quality award
Government commitment	Processing technology	
Diversified crop types	Stable supply and power	
Skill enhancement	Semi-refining technology and storage	
Sustainable supply of noug and ground nuts	Quality standard	
Access to finance and technical assistance	Industrial area with enough space	
Sufficient supply of quality seed at reasonable price	Quality standard	
Stop export of noug, stable market	Electricity, processing technology, skill, processing space	
Input supply		

6. What support from whom, currently not available, do you need to make business decisions?

Capacity building on GMP, market information, labelling
Stop duty-free import of palm and export of seed
Direct link with farmers, trading houses like EXC, consistent taxation
Skill development training, technology support, management, and quality production
Legal enforcement, quality of seed, stable market
Stable input supply, community awareness of quality
Supply shortage and low quality
Access to finance from government or private sector
Government to facilitate seed supply
Penalty on those who compromise quality

7. Do you know an option that was not discussed today or have you any comments?

Immediate implementation of discussions from this forum
Study was useful
Training on production
VAT, discussion forums
Awareness creation of refineries by processing technologists
Capacity building training
Studies on how to reverse 46-54 market share of domestic and import via import substitution
VAT

Appendix 5

Explorative cost price estimate edible oil per litre for small and medium-sized millers

Basic assumptions

- Output: the average medium-sized miller produces an output of 1.3 tonnes of edible oil per day.
- Input: supply to produce this is 4.3 tonnes pure noug seed.
- 30% input output ratio: 1 kg noug seed makes 0.30 litre oil.
- 26 days of operation per month.
- Estimated sale price: ETB 36 per litre.
- Seed price: 1,000 kg noug seed = ETB 10,000.

Step in model

		Investment (ETB)	Annual depre- ciation	Annual dep. (ETB)	Per month (ETB)	Per day (ETB)	Per litre (ETB)
Fixed costs (A)							
Depreciation for various pieces of machinery	Sieving	20,000	20%	4,000	333	12.82	0.01
	Crushing and pressing	30,000	20%	6,000	500	19.23	0.01
Interest							
Rent					1,500	58	0.04
Maintenance and spare parts					2,000	77	0.06
Labour			5 people (ETB 25)		3,250	125	0.10
Other:							
Total fixed costs (A)					7,583	292	0.22
Variable costs (B)							
Supplies	Seed input per daily prod. of 1.3 tonnes oil	4.3 tonnes seed			1,118	43,000	33.08
Utilities	Electricity per daily prod. of 1.3 tonnes oil	8 hrs			1,200	46	0.04
	Heating per daily prod. of 1.3 tonnes oil	1 m ³ wood			4,680	180	0.14
Other	Transport				a)	a)	a)
Total variable cost per litre (B)							33.25
Total cost per litre (A+B)							33.48
Sales tax	ETB 5 per litre						5.00
Sale price							36.00
Margin							-2.48
a) Cost of transport not included.							

Step up model

		Investment (ETB)	Annual depreciation	Annual dep. (ETB)	Per month (ETB)	Per day (ETB)	Per litre (ETB)
Fixed costs (A)							
Depreciation for various pieces of machinery	Sieving	20,000	20%	4,000	333	12.82	0.01
	Crushing and pressing	30,000	20%	6,000	500	19.23	0.01
	Semi-refining	170,000	20%	34,000	2,833	108.97	0.08
Interest							
Rent					1,500	58	0.04
Maintenance and spare parts					8,000	308	0.24
Labour			5 people (ETB25)		3,250	125	0.10
Other:							
Total fixed costs (A)					16,417	631	0.49
Variable costs (B)							
Supplies	Seed input per daily prod. of 1.3 tonnes oil	4.3 tonnes seed			1,118	43,000	33.08
	Chemicals for semi-refinery				10,140	390	0.30
Utilities	Electricity per daily prod. of 1.3 tonnes oil	8 hrs			3,800	146	0.11
	Heating per daily prod. of 1.3 tonnes oil	1 m ³ wood			4,680	180	0.14
Other:							
Total variable cost per litre (B)							33.63
Total cost per litre (A+B)							34.11
Sales tax	ETB 5 per litre						5.00
Sales price							36.00
Margin							-3.11

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