Jo H.M. Wijnands, Gerdien W. Meijerink and E.N van Loo, (2011) Assessing Soybeans and Sunflower Seeds Production Opportunities for Ethiopia. In: Geremew Terefe, Adugna Wakjira and Dereje Gorfu (Eds). (2011) Oilseeds. Engine for Economic Development. Addis Ababa, Ethiopian Institute of Agricultural Research.

Soybean and Sunflower Seeds Production Opportunities in Ethiopia

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Introduction

This paper assesses opportunities for Ethiopia in soybeans and sunflower seeds production. Ethiopia produces an attractive portfolio of oilseeds. First, the country is the third largest world exporter of sesame seed, an important exporter of noug (niger seed) and the fifth largest producer of linseed. Oilseeds are Ethiopia's second largest export earner. Second, at the same time Ethiopia imports large quantities of edible oil, mainly palm oil. The value of these imports ranges between 40 and 50% of the export earnings of the oilseeds (Wijnands et al., 2009). Third, Ethiopian oil millers aim to improve the competitiveness of edible oil (PPP, 2009). On the world markets, soybean is the largest oilseed commodity (96 million tonnes for export) and sunflower seed (2.6 million tonnes for export) takes the third position with 2.5 times more tonnes of exports than linseed. Sunflower seeds are preferred as a source for omega-6 oil in the food industry. Ethiopia produces small quantities of these seeds and thus plays a significant role neither on the domestic nor on the world market. In this paper, the used data sources and research methodology are discussed. In the result section, present and future demand for human consumption of edible oil and the potentials of sunflower and soybean, the structure and performance of oil millers, the cultivation of these crops in Ethiopia, and finally the business opportunities and key issues in the SWOT framework are discussed, conclusion drawn and recommendations given.

Materials and Methods

Data sources

Data from FOA Stat, OECD, UN Comtrade, World Bank and from the Ethiopian Central Statistical Agency (CSA) are the inputs in this research. Ethiopia will be benchmarked against other oilseed producing countries, including those countries in East Africa. Desk research of literature was the second source of information.

Assessment of Opportunities

The Strengths Weaknesses Opportunities and Threats (SWOT) analysis followed the standard approach from the management literature (David, 1999; Higgins and Vincze, 1993; Wright et al., 1998). The method is widely used in strategic management at firm level and less frequent for industries. The latter means the use of aggregated data of companies as well as macro-economic data. The SWOT analysis has a sequence of 6 steps, discussed below for industries at country level.

Mission and goal statements

The mission and goal statement provide the focus of the analysis. For oilseeds, e.g. it matters whether the focus is on the domestic, the international commodity market, or a specialty market in a specific region. First, the product specification may have quite different requirements. Second, the competitors will differ. Both determine the competitiveness of the industry on a specific market, because of different external environment and different competitors.

External analysis

The threats and opportunities are the main items for analysing the external environment and are out of control for the industry. These threats and opportunities are derived from the macro-environment and the industry environment. The elements of the macro-environment are political, legal, economic, technological, and social forces, which affect the industry. An example is given to clarify the impact of the industry focus. Let us assume that the goal is achieving a higher market share on the European market. Population growth is a threat for this goal, because the domestic consumption rises and less produce is available for the foreign market. If, however, the domestic market is the focus, population growth is an opportunity because the market size is growing.

Internal analysis

The industry's strengths, weaknesses, and the internal environment have to be categorized. These issues are under control of the industry. On these issues the performance of the industry is compared with others or self-imposed standards based on the own experiences in the past. It should be an international benchmark. If industries in other countries outperform the domestic industry, the foreign industries will take over the market, unless the openness of the economy is limited. Competitive advantage refers to resources that cannot fully be duplicated by other countries. The main resources in this respect are human, organizational, and physical resources. A competitive advantage in oilseed might be a specialty oilseed (taste, fatty acid composition) which is unique on the market or a price below average. Abundant availability of labour, land or high yields, as such, is not a competitive advantage; they are an advantage if they result in a lower price or a better quality for the same price compared with the competitors. The scope of analysis is thus a comparison with the performance of the competitors on a specific market.

Strategy formulation

Market strategies are based on the SWOT analysis. The Key Success Factors (KSF) are deduced from the confrontation matrix of the SWOT analysis for a specific market. KSF define issues that need attention to achieve the goal and can be influenced by the industry's actors. Suppose that the price is too high on the market; the KSF is a price below the price of competitors. In the Ethiopian oilseed industry, this can be achieved by, for example, higher yields or more efficient logistics. The basic determinants of the strategies are mostly 'cost price leadership' or 'differentiation', which will result for instance in a 'low cost', 'niche', 'differentiation strategy' or 'mixed strategies'. For oil millers, a KSF might be quality and food safety certification for export to European markets. This KSF is of low importance for the domestic market. On the domestic market, the KSF might be a product quality of edible oil at the same level as the imported palm oil.

Implementation of the strategies

This refers to how the level of the KSF can be achieved so that the goal can be achieved. For instance, the Ethiopian sesame seed sector has to reach a cleaning level of 99.9% to meet the requirements of the European bakery standards. This can be reached by buying proper cleaning equipment or by outsourcing sesame seed cleaning to European cleaners.

Control and evaluation activities

These activities are self-evident. If the cleaning level has to be 99.5%, this should be measured and guaranteed to the buyers. An evaluation question is 'Are the goals achieved by the implemented strategies?' This might lead to a restart of the SWOT cycle analysis. Again just as an example, suppose the cleaning level is fully achieved, but the market size has not grown. What are the reasons behind it? The price level might be too high or the contract conditions are not acceptable by customers. The obstacles have to be evaluated: a SWOT analysis will be helpful.

The last two steps will not be discussed in this paper. This is an operational responsibility of actors involved in implementing a strategy.

Results

Developments in Human Consumption of Fat, Vegetable Oil and Proteins

The consumption of fat (including vegetable oil) and protein shows a strong correlation with income; higher incomes have higher consumption levels of fat or protein, as is shown in figure 1. The vegetable oil consumption in Ethiopia is 1.5 kg/head/year (world average 11 kg/head/year) and consumption of proteins is 18.9 kg/head/year (world average 27.7 kg/head/year). The consumption of vegetable oil and oilseeds will grow because of income growth, especially in developing countries, and because of a growing population. Next to human consumption, the use of vegetable oil for biodiesel is expected to expand (OECD-FAO, 2009). Ethiopia had a GDP growth of 7% in 2009 and 12% in 2008 and a population growth of 3.2% in 2009. These figures indicate that the demand for edible oil and proteins will grow at least one-third in the coming 10 years due to the population growth only, and even with 50% if the income growth is taken into account.

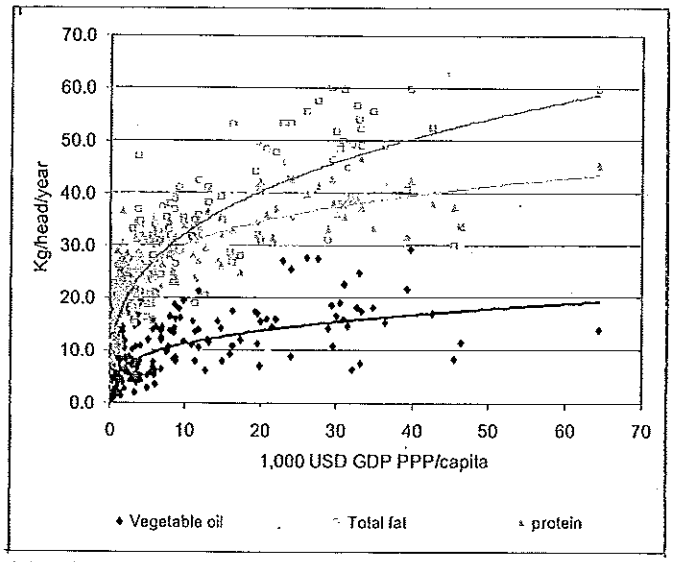

Fig. 1. Protein, vegetable oil and fat consumption in kg/head/year related to income
Source: OECD-FAO and WDI

About 85% of the vegetable oil is used for food and feed purposes and 15% for industrial use such as paints, lubricants, or specialty chemicals. Vegetable oil contains essential fatty acids that regulate a wide range of body functions. Vegetable oils provide two essential fatty acids: Linoleic Acid and Alpha-Linolenic Acid, which the human body cannot produce itself. Unsaturated fatty acids are said to have beneficial effects on human health. Plants that produce high levels of omega-3 (C 18:3) or omega-6 fatty acids (C 18:6) are preferred. Linseed has a high level of omega-3 fatty acids, whereas noug, safflower, and sunflower are rich in omega-6 fatty acids (Wijnands, et al., 2009).

Ethiopia imports large amounts of edible oil, mainly palm oil. The value of these imports ranges from 56 million USD in 2006 to 75 million USD in 2007. This is 40 to 50% of the export earnings of oilseeds; in 2008 the value of the import of edible oil wais almost on the same level as the value of oilseeds exports.

Uses of Soybeans and Sunflower Seeds

The composition of soybeans and sunflower seeds is presented in Table 1. This composition depends on the cultivar and growing conditions, such as climate or nutrients. Soybeans are known as food in tropical Africa. Dry soybeans are used in relishes, in the preparation of milk substitutes and as flour. A protein-rich product is a tofu-like product. The flour of soybeans might be a component for bread or as a starch to thicken soup. Dry-roasted soybeans are used as snacks or as a

substitute for coffee. Oil extracted from soybeans is used in the food industry. Soybean oil is an important source of vegetable oil: as cooking or salad oil, shortenings and in margarine. Furthermore, elements of the soybeans have numerous industrial uses in the food as well as in the non-food industry (Giller and Dashiell, 2007). After oil extraction, oil cake, rich in protein, remains that can be used either for human food or for livestock feed.

Table 1. Composition of soybeans and sunflower seeds in % of the dry seeds

Crop	Water	Protein	Oil				Carbo-hydrate	Dietary fibre
			Total	Oleic C18:1	Linoleic C18:2	Linolenic C18:3		
Soybean	9	36	20	4	10	1	30	9
Sunflower	5	23	50	8-18	30-36	< 0.05	19	11

Sources: (Giller and Dashiell, 2007; Vossen and Fagbayide, 2007)

Edible oil of sunflower seed has an excellent quality: good taste, light colour, with negligible levels of toxins. Like soybean oil, it is used as cooking or salad oil and as a major ingredient for margarine. Inferior quality sunflower oil can be used in non-food applications, such as in varnishes, paints, or soap. Defatted sunflower meal can be used as a partial substitute for wheat flour for bread and cakes for human consumption. A protein rich meal remains after oil extraction that can be used as animal feed (Vossen and Fagbayide, 2007).

Both seeds are very suitable for human consumption. The high proportion unsaturated fat is highly valued in the developed countries. It is unclear whether the Ethiopian also values these features. Fininsa et al. (2006) concluded for another bean variety *'Utilization of various dishes of common bean is not yet advanced in Ethiopia'*. The consumption level of vegetable oil is approximately 1.5 kg per head: in the rural areas often, unrefined oil is used. Like the production of soybeans and sunflower seeds of 7 million tonnes each, these seeds together count for around 2% of the total oilseed production, imports of soybeans has been in most years negligible and reached only in 2007 the level of domestic production. Soybean oil imports are low and only in 2005 it reached 0.4 kg/head, palm oil import is mostly far below 1 kg/head although in 2008 it reached an all-time high of 2 kg/head. The Ethiopian population has thus a low tradition in using seeds or oil from soybeans or sunflowers.

Oil Millers

Ethiopia has a large number of local small-scale oil processors. The firms mentioned in Table 2 are almost all crude oil producers. The number of processors of (semi) refined oil is estimated at 9 to 15. Table 2 shows that two third of the (crude) oil (measured as gross value of production) is produced by small-scale producers. Since 2008, food regulations oblige the refinement of plant oils for human consumption. However, until now the legislation has not been fully enforced. The small-scale millers cannot fulfil this obligation. The oil crushers association is active to improve the facilities and focuses on a code of good manufacturing practice on processing; new marketing possibilities for deodorized oil and more attention to the raw material supply chain (Wijnands et al., 2009). The low capacity utilization of the edible oil refineries is major weakness and offers opportunities to increase employment and lower the cost price. The capacity utilization is at present estimated below 25% (PPP, 2009).

Table 2. Key figures of the edible oil industry in Ethiopia in 2004/2005

Oil producing industry profile	Large and medium size	Small size	Total
Number of establishments	26	834	860
Number of persons engaged	1,192	4,120	5,312
Gross value of production (GVP) (1,000 Birr)	109,810	202,935	312,745

Own calculation based on data from Bactec (2007)

The Ethiopian edible oil market is trapped between cheap, currently tax free imports of palm oil on the one hand, and the high level of standards for the export of oil on the other hand (ISO, HACCP, BRC). At the moment, domestic edible oil producers find it very hard to compete with the imported 20 litres of palm oil jerry cans. Only a few Ethiopian crushing and refinery units can reach export quality (Schenk, et al., 2009). The main challenges for the oil-crushing sector in Ethiopia are to ensure adequate and steady supply of oilseeds and to compete with world market prices. Local production costs of oilseeds such as noug, linseed and rapeseed and local crushing exceeds world market prices. A great concern for Ethiopian oil millers lies in the unequal taxation of edible oils. Whereas palm oil can be imported without import tax and VAT, domestically produced oil is liable to pay VAT.

Soybean and Sunflower Seeds Production and Trade

Ethiopia produces a wide range of oilseeds. Sesame seed (217,000 tons in 2008/2009), noug (181,000 tons), and linseeds (156,000 tons) are the most important (CSA, 2008/2009). The business opportunities for Ethiopian sesame seeds have been analysed in 2007 (Wijnands et al., 2007) and for linseeds in 2009 (Wijnands, et al., 2009). Thus, this paper focus only on soybean and sunflower seeds. Soybeans are the largest commodity in world trade and sunflower seeds are the third, but in Ethiopia, both crops have a share in overall Ethiopian oilseed production of a mere 1%.

Soybeans

The main characteristics of the top-5 producer, exporter, and importer countries of soybeans are summarized in Table 3. To assess the position of Ethiopia, Ethiopia and some countries in the region are included. Of the world production of soybeans, 36% are exported. This indicates that two thirds of the production is either domestically consumed or processed. The top-3 producers, USA, Brazil, and Argentina produce together 80% of the world's soybeans, and these countries have a share of 90% of total world exports. Nevertheless, over 50% of the production is used for domestic consumption but mainly for processing purposes. These three countries are also the top-3 exporters of soybean oil, with a world market share for USA 10%, Brazil, 21% and Argentina 41%. The Netherlands (5%) and Germany (4%) are number 4 and 5 of soybeans oil exporters, based on imported seeds. It can be concluded that soybeans are mainly consumed or processed domestically.

Table 3. Characteristics of soybean production, export, and import (averages 2006-2008)

Country	Production ('000) ton	Production growth* (%)	Yield (kg ha^{-1})	Yield growth* (%)	Export ('000) ton	Export growth* (%)	Export/ production (%)	Import ('000) ton	Import growth* (%)
Major soybeans producers, exporters and importers									
World	222,951	4.0	2,371	0.6	79,390	6.3	36	68,819	4.2
USA	78,969	1.4	2,746	1.9	36,413	4.6	46	298	17.2
Brazil	56,746	4.9	2,670	-0.5	24,397	7.3	43	81	-39.8
Argentina	44,751	7.9	2,824	1.1	10,483	7.2	23	1,950	44.5
China	14,590	-1.5	1,608	-1.4	434	10.4	3	32,163	16.0
India	9,623	9.4	1,080	2.3	9	-35.6	0	0	11.4
Paraguay	5,536	8.6	2,267	-2.5	3,088	5.2	56	14	
Canada	3,166	8.7	2,659	5.9	1,735	19.3	55	295	-16.3
Japan	228	-3.0	1,630	-1.8	4	114.1	2	3,971	-4.6
Mexico	108	-0.7	1,643	-0.4	0	-23.0	0	3,628	-3.5
Germany	1	2.9	1,000	-10.5	38	10.4	3843	3,571	-4.5
Netherlands	-	-	-	-	1,099	6.0	-	4,062	1.9
Countries in the Ethiopian region									
Egypt	26	4.9	3,243	1.0	0	-	2	675	-
Congo	16	3.4	483	0.1	0	-	0	0	-
Ethiopia	7	15.0	972	4.6	2	-	24	3	-
Kenya	2	0.9	836	0.9	4	36.6	193	21	53.3
Tanzania	2	2.5	380	0.4	0	-	6	2	-24.7

Source: Own calculation based on FAOstat, and Uncomtrade; Growth is the annual growth in % between the average values of the years '2001-2003' and '2006-2008'

Brazil and Argentina are out-performing the USA in production and export growth. Brazil showed a negative yield growth, whereas USA and Argentina have yield growths that are above average. This indicates that these countries are framing the level playing field. If Ethiopia wants to become a supplier on the world market, the country will have to make huge investments. Other oilseeds (sesame, linseed of noug) offer better opportunities (Wijnands, et al., 2009). China is the main importer of soybeans: 47% of world's imports. The Netherlands, Japan, Germany, and Mexico have a share between 5 and 6%. The Netherlands is partly a transit country based on Rotterdam port: one quarter of the imports is re-exported.

How is Ethiopia performing? The benchmark countries are taken in the region, selected on nearness and availability of production data in the FAO database. Ethiopia showed a remarkable growth in production and in yield per ha. The yield per ha is high compared with other countries in the region (except Egypt, which has very high yields) but far below world average. It looks like Kenya has a regional transit function, rather high imports, and exports: higher than the domestic production.

Sunflower seeds

Table 4 presents the main characteristics of sunflower seed producing countries. The world production is around 14% of that of soybeans in 2006-2008. World exports are 11% of the production and are much lower than for soybeans. This means that around 90% of production is consumed in the country of production. Another distinction is that the largest producers in the world are not among the top-3 exporters. The main exporters are the Central European countries, Hungary, Romania, and Bulgaria with each a share in the world production below 4%, their export share is between 37 and 44% of the world total.

The yield per ha in Ethiopia is below world average, but also below most countries' level in the region. The opportunities for Ethiopian sunflower production seem to be on the domestic market.

Table 4. Characteristics of sunflower seeds production, export and import (averages 2006-2008)

Country	Production ('000) ton	Production growth* (%)	Yield (kg ha^{-1})	Yield growth* (%)	Export ('000) ton	Export growth* (%)	Export/ production (%)	Import ('000) ton	Import growth* (%)
Major sunflower producers, exporters and importers									
World	31,039	5.2	1,325	2.1	3,306	2.3	11	2,867	0.6
Russian Federation	6,588	12.0	1,166	4.9	138	-8.1	2	11	11.0
Ukraine	5,342	10.4	1,370	4.8	233	-14.4	4	6	42.7
Argentina	3,968	2.1	1,675	-0.6	50	-25.3	1	27	56.6
China	1,613	-1.3	1,751	2.4	120	21.2	7	4	2.9
France	1,453	-1.0	2,437	1.3	398	-0.3	27	108	-7.9
USA	1,281	-0.1	1,527	2.1	195	5.5	15	81	-0.6
Hungary	1,227	8.9	2,308	3.7	448	6.1	37	22	34.6
Romania	1,081	-0.5	1,244	1.3	497	19.1	46	61	26.3
Bulgaria	1,021	10.7	1,445	3.7	449	14.8	44	7	0.6
Turkey	988	5.2	1,725	3.8	9	26.3	1	475	10.8
Spain	746	-1.4	1,146	2.7	54	31.3	7	403	-0.9
Italy	283	-3.3	2,206	3.2	13	15.7	5	234	6.2
Germany	54	-2.0	2,184	1.4	23	-21.0	42	272	-1.5
Netherlands	-	-	-	-	44	4.8	-	348	-6.4
Countries in the Ethiopian region									
Uganda	185	9.1	1,088	1.2	2	-	1	0	-
Sudan	72	39.6	1,154	5.6	0	-	0	0	-
Egypt	29	-4.8	2,475	1.6	5	-	16	2	-
Tanzania	28	0.5	340	0.1	3	41.4	11	0	28.9
Kenya	14	2.0	1,077	2.0	1	9.6	6	2	112.8
Ethiopia"	7	-	838	-	0	-	-	0	-

Source: Own calculation based on FAOstat, and UN Comtrade ; Growth is the annual growth in % between the average values of the years '2001-2003' and '2006-2008'; " Production and yield 2008/2009 from CSA

Soybean and Sunflower Cultivation in Ethiopia

Cereals are the main crops in the arable production in Ethiopia. Almost all holdings grow cereals; these crops occupy 78% of the arable land. Table 5 provides some characteristics. Sunflowers are grown by 1.2% of the holdings with an average acreage of 0.05 ha/holding. CSA does not provide data on the regional distribution. Soybeans are grown by 0.5% of the holdings with an average acreage of 0.1 ha/holding. The main specified production regions of soybeans are Oromia and Benishangul-Gumuz (Table 6). Noteworthy is that the 38% of the crop area, producing 46% of the soybeans, with the highest yields per ha and highest acreage/holding are not specified. It might be that in these not specified regions locate relative large holdings with relatively good access to inputs (fertilizers, chemicals, improved seeds). A second remark concerns the soybeans yields/ha: in the CSA statistics, these are one third higher than the FAO statistics: CSA 1,267 kg ha^{-1} and FAO 972 kg ha^{-1}. The small acreages per holding result in production per holding of 130 kg for soybeans and just 45 kg for sunflower seeds. The production might be for family or local consumption. If they are cash crops, it will be clear that large efforts are needed to collect sufficient quantities for distribution or processing.

Table 5. Crop production in Ethiopia in 2008/2009 (2001 EC)

Crop	Holdings		Area		Area (ha/holding)	Production		Yield (kg ha^{-1})
	('000)	(%)	('000) ha	(%)		('000) ton	(%)	
Total Crops	12,231	100.0	11,211	100.0	0.92	17,117	100.0	-
Cereals	11,921	97.5	8,770	78.2	0.74	14,496	84.7	-
Pulses total	7,091	58.0	1,585	14.1	0.22	1,965	11.5	-
Soybeans	62	0.5	6	0.1	0.10	8	0.0	1,267
Oilseeds total	3,287	26.9	855	7.6	0.26	656	3.8	-
Linseed	1,173	9.6	181	1.6	0.15	156	0.9	863
Sunflower	152	1.2	8	0.1	0.05	7	0.0	838
Sesame	612	5.0	278	2.5	0.45	217	1.3	780

Source: www.csa.gov.et

The small acreages raise some questions about the opportunities of sunflower or soybeans compared with other crops:

- Do other crops offer better agronomic and/or economic opportunities? Pulses are part of the cropping plan, which means that nitrogen supply by leguminous crops is a known technique.
- Do constraints, such as labour during peak periods or capital, restrict cultivation of soybeans or sunflowers?
- Do consumers have a low preference for soybeans and sunflowers?

Table 6. Soybean production in Ethiopian regions in 2008/2009 (2001 EC)

Region	Holdings		Area		Area (ha/holding)	Production		Productivity (kg ha^{-1})
	Number	%	ha	%		ton	%	
Ethiopia	61,751	100	6,236	100	0.10	7,899	100	1,267
Tigray	5,217	8	562	9	0.11	724	9	1,290
Oromia	30,879	50	1,688	27	0.05	1,948	25	1,154
Benishangul Gumuz	10,461	17	1,397	22	0.13	1,453	18	1,040
SNNPRS	7,625	12	204	3	0.03	154	2	756
Others	7,569	12	2,386	38	0.32	3,620	46	1,517

Source: www.csa.gov.et

Ethiopia, situated near the equator, has favorable climate zones to grow soybeans. Soybeans require a temperature around 32 °C, moist soils, a pH between 5.5 and 7.5 and 850 mm of water for an optimal growth and development. Nitrogen fixation may be inadequate where P is limiting or soybeans have not been cultivated previously. Giller and Dashiell (2007) provide an overview of the crop management. Soybeans have been grown since 1950 and in the seventies already, around 6,000 tons on 2,000 ha were produced. The same level as nowadays, but the yield was around 500 kg/ha higher than the present average yields. The results were achieved on trial level by the EIAR (Endrias Geta and Sisay Assefa, 2006).

Sunflowers require a temperature between 23-27 °C, most soils, a pH between 5.7 and 8.1 and 300-700 mm water for an optimal growth and development. Dry weather after seed set is important for adequate ripening of the crop. An overview of the crop management is provided by Vossen and Fagbayide (2007). Ethiopia has suitable climate zones, but the yield per ha is below world average and most other countries in the region. Experiments have shown that a production of 3,189 kg ha^{-1} is achievable (four times the average in 2008/2009), depending on the variety and the growing conditions (soil, water) (Bayu et al., 2007). Mixed cropping of tef and sunflower are complementary in resource utilization and result in higher total yields and up to 50% higher incomes. It should be noted that within the same research the second location did not show any advantages and the achieved yield level for sunflower was 757 kg ha^{-1}.

Institutional Environment

Knowledge, improved inputs and improved cultivation technologies are of major importance, without these improved technologies, opportunities such as higher yields will never be exploited fully. However, the institutional environment is as important as technologies.

Institutions can be defined as the humanly devised constraints that structure political, economic and social interactions. They consist both of informal constraints, such as customs, traditions and common norms, and formal rules, such as laws and property rights (North, 1991). Another definition emphasizes the rules that are needed to facilitate the game of economic exchange: institutions are the rules of the game. "Formal rules include political (and judicial) rules, economic rules and contracts. The hierarchy of such rules, from constitutions, to statute and common laws, to specific bylaws, and finally to individual contracts defines constraints, from general rules to particular specifications" (North, 1990). The rules of the game are important for two reasons. First, well-understood rules establish baseline conditions for human interaction, and give certain predictability to what other parties will do in a particular context, that permits the actions of different individuals to be coordinated, and efficient transactional agreements to be achieved. Second, rules can serve to discourage or rule out actions that, if widely practiced, would be economically costly, and encourage actions which, if widely taken, can be productive for all (Nelson and Sampat, 2001).

Institutional challenges based on a quick desk research of several papers are identified. As these challenges are relevant for other more important crops, these are even of more importance for the very small crops sunflowers and soybeans. These challenges, lessons learned or success factors are:

Inputs and financial resources

- 'Small scale farms need financial sources outside their farm to adopt new technologies, as their costs are high and farm savings rates and capital formation are meagre (Endrias Geta and Sisay Assefa, 2006).
- The capacity to purchase inputs is very limited (Tesfaye Letta, et al., 2006).
- Resources are vital to facilitate adoption and dissemination of new technologies (Akalu Teshome, et al., 2006)
- Inadequate financial facilities to export (EPOSPEA, 2007).

Knowledge infrastructure

- Availability of technologies (Endrias Geta and Sisay Assefa, 2006).
- Linking research and extension more closely with actual farming practice (Tesfaye Letta, et al., 2006).
- A given appropriate and accepted technology by some farmers groups, farmers-to-farmers technology transfer is the most important means of technology dissemination (Getahun Degu, et al., 2006).

Market orientation

- Enhancing farmers' capacity and skills to produce for appropriate markets (Finansa, et al., 2006)
- Existence of market demand (Endrias Geta and Sisay Assefa, 2006).

Supply chain coordination

- Dedication of all partners (Endrias Geta and Sisay Assefa, 2006).
- Without the establishment of active and strong partnership as well as a shared vision between all chain-actors the technical opportunities will also not be viable (Solomon Assefa, et al., 2006).
- Forging effective links among institutions and relevant stakeholders are of vital importance (Tesfaye Letta, et al., 2006).

Government policies

- The policies for commercial transformation of Ethiopian agriculture seem to exist only on paper. The support provided and facilities required to transform the small scale subsistence agriculture are not adequately and timely put in place (Demese Chanyalew, 2006).
- Bureaucratic barriers at all stages of export clearance still persist (EPOSPEA, 2007).
- Public institutions lack understanding of their mandates and the law enforcement is weak (EPOSPEA, 2007).

This overview shows that abundant research is done by Ethiopian research and non-governmental organizations to identify the importance of institutions in transforming subsistence to commercial agriculture. These factors are out of control for individual farmers or other chain actors.

Supply Chain and Transaction Costs

The number of actors in the supply chain is huge. Table 5 indicates over 150,000 producers of sunflower seeds and 60,000 soybean producers. This results also in a large number of the collecting wholesalers, traders, intermediaries, or distributing wholesalers. The major market for oilseeds is Addis Ababa, with approximately 50 main traders and over 300 wholesalers. In addition, the number of processors is in hundreds and maybe in thousands if small-scale village crushers are added. These large numbers do not stand for an inefficient supply chain: many actors are competing, which lead to low costs. Many smallholders, with a small production each, demand many chain actors downstream. Whether this atomistic structure leads to high transaction costs depends on the final market. If the final market is the local community, the transactions will be executed directly within informal constraints based on customs, tradition, and social control (Gelalcha, 2009). The chain will then have only a few links. However, if the final market is at a far distance and large quantities are required, the transaction costs will be rather high. The long market chain is identified as a threat for the oilseed industry by EPOSPEA (2007). Higher transaction costs result from opportunistic behaviour (EPOSPEA, 2007) and bounded rationality such uncertainty about market conditions, technology and behavioural aspects (Williamson, 1979). In the case of large quantities for a market at distance, many actors will to lead to some drawbacks:

- A low uniformity of the supply emanate from variation in growers that use different varieties and different agronomic conditions. Blending of such supply might be undesirable.
- Tracking and tracing will be very difficult. Product deficiencies cannot be passed to previous links in the chain. Producers will get no information to improve their product quality.

Market Selection and Strategies

The Ethiopian oilseed industry has the choice of several markets from local rural markets to high demanding foreign markets. Several countries have a very strong position on the world market of soybeans and sunflower seeds. Ethiopian soybean and sunflower seeds have low opportunities on foreign markets. A possibility might be processing the seeds into edible oil production with a high quality standard for the international market. Quality oil can be characterized as a relatively new product on the Ethiopian market: Ethiopia does not yet produce such quality oil. Export of edible oil to foreign markets, in fact new markets, complicates the introduction even further. A new product on a new market is not a recommendable strategy: failures outnumber strongly the successes.

In the SWOT analysis, we focus on bottled oil on the domestic market: a substitute for imported palm oil. Even with this focus, the market can be segmented in e.g. the urban markets in cities with relatively high quality standards and rural market with direct consumers for the oil and oilseed cake. 17% of the 85 million Ethiopians live in urban regions: the urbanization growth of 4.3% is higher than the population growth of 3.2% (CIA, 2008). The number of people in urban regions is expected to grow with 50%. Several other markets will not be discussed, such as the demand for soybeans or sunflower seeds for direct consumption without or after little processing.

The cost price strategy as distinguished by Porter is recommended (Porter, 1980). The Ethiopian GDP per head is in the lowest percentile worldwide. The share of income spent on food is very high in Ethiopia. The edible oil processor should aim at a basic quality on par with imported oil. Cost leadership requires efficient-scale facilities (which is not by definition large scale) and cost control. Paying attention to quality and service remains of importance. Cost leadership requires market share and favourable access to raw materials. A differentiation strategy might offer opportunities in later stages. First, the industry needs to be more mature and efficient before creating unique products. Porters' third strategy 'focus on a particular segment' is out of scope, because the market orientation is too weak even for the cost price strategy.

Key Issues Based on a Confrontation Matrix

As mentioned, the SWOT analysis will focus on cost price strategy for the domestic edible oil market. The market segments are the urban regions with relatively high quality requirements and the rural regions with basic quality requirements. To identify the Key Success factors the Strengths and Weaknesses are confronted with the Opportunities and Threats. This results in a matrix with four quadrants. The four quadrant of the SWOT confrontation matrix (Figure 2) can be interpreted as follows:

- Quadrant Strengths/Opportunities offers opportunities to exploit the strengths and successes are achievable.
- Quadrant Strengths/Threats indicates issue to challenge the threats. Strategies should focus on how to tackle the threats.
- Quadrant Weaknesses/Opportunities means that the weaknesses have to improve to exploit the opportunities.
- Quadrant Weaknesses/Threats means improving weaknesses to challenge threats. Usually industries withdraw from such markets. As will be shown below, for Ethiopia it will be necessary to improve the performance despite the weaknesses and threats. In the case of Ethiopia, agriculture is the most important economic sector. Withdrawal is no option, because little alternatives are available. Therefore, issues in this quadrant will be discussed.

The strategic issues focus on enhancement of the strengths and on neutralizing or boosting the weaknesses. The aim is exploiting the opportunities. The relevance is indicated by a single or double *. The requirements to exploit the opportunities are indicated by Key Success Factors (KFS).

Table 7. SWOT analyses of oilseed production in Ethiopia

		Strengths		Weaknesses							
		Knowledge in growing oilseeds/pulses		Many chain actors	Insufficient knowledge crop rotation	Low yield levels soybeans	Economic benefits at farm level unclear	Poor capacity utilization oil millers	Limited experience with quality standards	Insufficient market orientation	Opportunistic behaviour
Opportunities	Growing demand for vegetable oil	**			**	**	**			*	
	Demand for higher quality oil			**					**	**	**
	Growing urban population							**	**	**	
	Land and labour availability			*		*					
	Crops research and extension at good level			*	**	**	**				
Threats	Imports of oil at low prices							**	**		
	Unavailability of capital for input purchases					**					
	Weakly performing institutions						**	**			**

Discussion

The Ethiopian agriculture and oil processing industry is a puzzle for us. On the one hand we observe that field trials at farm level confirm that yields per ha can be doubled for many crops and on the other hand, actual yields are still far below these levels. Second, whereas some crushing and refinery units can achieve export quality, they nevertheless cannot compete with imported palm oil on the domestic market. This weak performance is remarkable given the advantage of the domestic supply of raw materials. Ethiopia is among the top-5 world producers of linseed. Socio-economic research has also identified success factors: how to achieve higher yields and higher farm incomes. The difference between yields in field trials and actual yields at farm level suggests a knowledge gap. Identification of that gap is of major importance for the transition of the oilseed industry to achieve a higher performance.

The quick scan of literature did not provide us references of optimization nor of cropping plans at family holding level, given agronomic and socio-economic constraints or of oil processing industry neither of market segments for edible oil or oilseeds. It is remarkable that the current Ethiopian policies are aiming at being a relevant world exporter of oilseeds and even of specialty edible oils.

Conclusions and Recommendations

The consumption of vegetable oil and of protein in Ethiopia will rise due to the population and income growth. The domestic consumption growth is estimated to be 30-50%, a huge opportunity for the oilseed growers and processors. Whether products of soybeans or sunflowers fit in the Ethiopian consumption patterns is unclear.

Ethiopia has suitable climates and growing conditions for sunflowers and soybeans. However, sunflowers seeds and soybeans count each for approximately for only a negligible 1% of the Ethiopian production of oilseeds. Ethiopia cannot take any position on the world market in the near future: the domestic market should be targeted. Nevertheless, the Ethiopian oil sector will face tough competition from imported palm oil.

Many weaknesses have to be transformed into strengths to achieve a relevant level of competitiveness on the domestic market and to neutralize several threats. A focussed strategy, which is shared among actors in the oilseed business, is recommended. The knowledge gaps that we have identified are a lack of evidence supporting the economic benefits for each chain actor of such a strategy and supporting the impact of the socio-economic, agronomic, and process technological constraints. We recommend developing economic models to analyse the possibilities, to perform sensitivity and risk analyses and to perform What-If scenarios.

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Databases

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CSA	www.csa.gov.et
FAO	http://www.fao.org/economic/ess/publications-studies/statistical-yearbook/fao-statistical-yearbook-2009/d-consumption/en/
OECD-FAO	http://stats.oecd.org/viewhtml.aspx?QueryId=20152&vh=0000&vf=0&l&il=blank&lang=en
PROTA	http://database.prota.org/search.htm
UNComtrade	http://comtrade.un.org/
WDI	http://web.worldbank.org (World Development Indicators)