Business opportunities and food safety of the Myanmar edible oil sector

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LEI WAGENINGEN UR

Ministry of Foreign Affairs

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This study was carried out by a consortium of experts led by LEI Wageningen UR and was commissioned and financed by The Netherlands Enterprise Agency (Rijksdienst van Ondernemend Nederland (RVO.nl)). The Agency encourages entrepreneurs in sustainable, agrarian, innovative and international business. The Agency works at the instigation of ministries and the European Union. RVO.nl is part of the Ministry of Economic Affairs and works on behalf of the Ministry of Foreign Affairs.

LEI Wageningen UR
Wageningen, december 2014

REPORT
LEI 2014-036
ISBN 978-90-8615-701-3

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Wijnands J.H.M., J. Biersteker, L.F. Hagedoorn and J. Louisse, 2014. *Business opportunities and food safety of the Myanmar edible oil sector; .* Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-036. 94 pp.; 26 fig.; 31 tab.; 55 ref.; 1 map

Dit rapport analyseert de business opportunity's van de sectoren oliehoudende zaden en eetbare olie in Myanmar, evenals het voedselveiligheid controlesysteem. Myanmar is een belangrijke producent van specialiteiten van oliehoudende zaden. Het is 's werelds grootste producent van sesamzaad, neemt de zesde positie voor pindanotenproductie in en voor mosterdzaad de derde positie. Echter de export is uiterst beperkt. Het voedselveiligheid controlesysteem van deze sector is zwak ontwikkeld. Myanmar heeft enorme kansen op de wereldmarkt: vreemde valuta inkomsten liggen in de grootte van het totale handelstekort van Myanmar door sesamolie te exporteren en gelijktijdig eenzelfde hoeveelheid palmolie te importeren.

This report analyses the business opportunities of the oilseed and edible oil sector in Myanmar as well as the food safety control system. Myanmar is a significant producer of oilseed specialities. It is world's largest producer of sesame seeds, ranks on the sixth position for groundnut production and for mustard seeds on the third position. However, the exports are insignificant. The food safety control system of this sector is developed weakly. Myanmar has huge opportunities on the world market: foreign currency earnings are in the magnitude of country's total trade deficit by exporting sesame oil substituted by importing a same amount of palm oil.

Key words: Myanmar, oilseeds, vegetable oils, sesame, groundnut, business opportunities, food safety

This report can be downloaded at www.wageningenUR.nl/en/lei (under LEI publications).

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LEI 2014-036 | Projectcode 2282500039

Cover photo: Jo H.M. Wijnands

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Preface and acknowledgement

The Netherlands Enterprise Agency (Rijksdienst van Ondernemend Nederland (RVO)) commissioned a consortium to identify the business opportunities of the oilseed sector in Myanmar and the long run viability of the National Edible Oil Quality Control Laboratory (NEOQCL). The NEOQCL, established by the FAO, is an up-to-date laboratory with advanced equipment for quality testing of oilseeds and edible oil. However, the laboratory is not yet operational. A reason is the need for training of the staff, as expressed by its head, Dr. Khin Moe Kyaw. The Netherlands Economic Mission in Yangon explored the possibility of the Dutch Government supporting this training. This study provides the opportunities of the oilseeds and edible oil sector in Myanmar. These opportunities also frame the long-run viability of NEOQCL embedded in the developments of the edible oil sector.

Jo Wijnands from LEI Wageningen UR led the study. Together with Jaap Biersteker (Biersteker Consultancy), they assessed the business opportunities of the Myanmar oilseed sector. Leo Hagedoorn (former FAO officer with a focus on food safety) assessed the food safety control system and Jim Louisse (Louisse Consulting) assessed the opportunities for NEOQCL.

We like to thank the full staff of the Netherlands Economic Mission in Yangon for their strong support. In particular, we thank the Agricultural Counsellor of the Embassy of the Kingdom of the Netherlands (EKN) in Bangkok, Mr. Geert Westenbrink, active in Myanmar, for his expressed interest and support. We also thank the FAO in Myanmar and the NEOQCL for their excellent support. Finally, we thank all the consulted stakeholders offering us opportunities to retrieve information, providing ideas on the development of the oilseed and edible oil sector and their needs for support. Their openness, cooperative attitude and eagerness to learn were heart-warming. We trust that this study will contribute to a prosperous development for all who are active in the oilseed and edible oil sector in Myanmar. We believe their product portfolio offers significant opportunities on the world market.

Ir. L.C. van Staalduinen
Director General LEI Wageningen UR

Map of Administrative divisions of Myanmar

Source: http://www.nationsonline.org/oneworld/map/myanmar_map2.htm

Symbols, Abbreviations, Acronyms and Measures Conversion

Symbols

.	Decimal indicator
,	1000 separator
€	Euro
$	USD

Abbreviations and acronyms

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
bn	billion=1,000,000,000=10^9
CEXCs	Crop Exchange Centres (CEXCs)
CSO	Myanmar Central Statistical Organisation
CTQM	Control Technology and Quality Management, laboratory of MoC
DoA	Department of Agriculture of MoAI
EU	EU-28
EU-28	European Union of 28 member states (Data in the past are summation of numbers of all 28 countries in those years)
EUR	Euro (€)
FAO	Food and Agriculture Organization
FDA	Food and Drug Administration, main department of MoH
FIDSL	Food Industry Development Supporting Laboratory
FOSFA	Federation of Oils, Seeds and Fats Associations
GAP	Good Agriculture Practice
GHP	Good Hygiene Practice
GMP	Good Manufacturing Practice
Ha	Hectare is 10,000m^2=2.4710 acre
HACCP	Hazard Analysis Critical Control Points
KSF	Key Success Factors
MAPT	Myanmar Produce Trading, department of MoC
MEODA	Myanmar Edible Oil Dealers' Association
MFPEA	Myanmar Food Processors and Exporters Association
MMK	Myanmar Kyat
m or mn	million=1,000,000=10^6
MoAI	Ministry of Agriculture and Irrigation
MoC	Ministry of Commerce
MoH	Ministry of Health
MoI	Ministry of Industry
MoL&F	Ministry of Livestock and Fisheries
MoS&T	Ministry of Science and Technology
MRLs	Maximum Residue Levels
NEOQCL	National Edible Oil Quality Control Laboratory of Myanmar
OFID	OPEC Fund for International Development
RVO	Rijksdienst voor Ondernemend Nederland (Netherlands Enterprise Agency)
RBD	Refined, Bleached and Deodorised
SWOT	Strengths-Weaknesses-Opportunities-Threats
UMFCCI	Union of Myanmar Federation of Chambers of Commerce and Industry
USD	United States Dollar ($)

Conversion tables from local to international measures

Local measures conversion table

1 Basket	16 Pyi	41 litre
1 Pyi	8 Tins	2.56 litre
1 Viss	1.63 Kg	
1 Tonne	612.5 Viss	
1 Kg	2.205 Pound	
1 Pound	0.453 Kg	
1 Acre	0.4047 Hectare	
1 Mile	1.61 Kilometre	
1 cubic foot	0.0283 cubic meters	

Source: CSO on citation from (Favre and Myint, 2009) page 233 and Wikepedia

Myanmar official standard weight unit for oil crops

Oil crop	Unit	Viss	Pound	Kg
Sesame	1 Basket	15.0	54	24.49
Groundnut with shell	1 Basket	6.9	25	11.34
Sunflower	1 Basket	8.9	32	14.51
Niger	1 Basket	15.0	54	24.49
Mustard	1 Basket	16.0	58	26.12
Soybean	1 Basket	20.0	72	32.65

Source: CSO on citation from (Favre and Myint, 2009) page 233

Density of $1m^3$ seeds

Product	Kg
linseed loose [a]	660-690
linseed in bag [a]	610-660
Sesame seeds in bags [a]	400
Rape seed[b]	640-770
Groundnuts unshelled[b]	290-380

Source: [a] http://www.debinnenvaart.nl/binnenvaarttaal/lijsten/sd-ladingen.html#sd_graan) ;

[b] http://www.caes.uga.edu/departments/bae/extension/handbook/documents/Density%20of%20Agricultural%20Products.pdf

Executive summary

Objective and approach

The aim of the study is to assess the global and domestic business opportunities of the Myanmar oilseed and edible oil sector and of the relevant Myanmar's food safety control system, with special emphasis on the National Edible Oil Quality Control Laboratory (NEOQCL) of Myanmar. The approach is a straightforward SWOT analysis resulting in identified opportunities. The SWOT is based on desk research, analysis of databases and consulting stakeholders in Myanmar.

Conclusions

The consulted stakeholders were eager to cooperate, eager to improve their performance and looking forward to enter export markets. They emphasised the need for better and higher raw material production and the need for formal standards and testing.

The Myanmar oilseeds and edible oil sector is recommended to focus on exports: this is one of the very few options for a prosperous future. A well mandated and operationally independent NEOQCL can support this export strategy. 'Business as usual' - continuation of the present practice - will result in a sector in disarray and a marginalised NEOQCL. The oilseed and edible oil sector has a product portfolio with the potential to earn around USD1bn foreign currency, by exporting its high value products. These additional earnings are in the magnitude of the Myanmar trade deficit even after subtracting the costs of the imports of a good quality palm oil to fulfil the national demand for cooking oil. The sector needs to implement an export strategy for which upgrading the whole value chain is necessary.

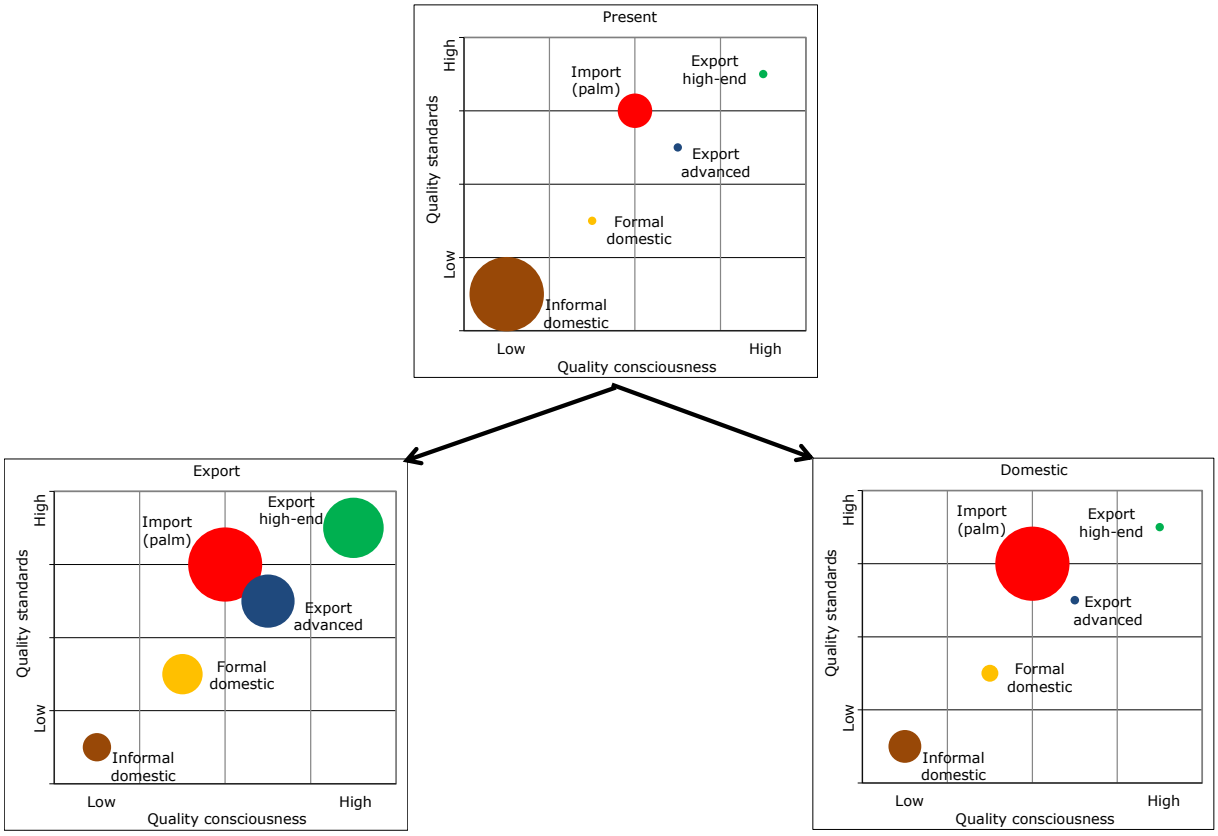


Figure 1 *Tentative developments* of the Myanmar oilseed sector.*
** Bubble size indicates market size.*

Improved seeds combined with good agricultural practice are the basis for producing more oilseeds of a higher quality. The oil millers need to upgrade their equipment and improve their efficiency. Next to

oil milling, opportunities are available in seed processing: hulling, roasting, and processing into snacks. The exporters have to focus first on export to China, a neighbouring country with a high demand with medium quality levels. Next, the EU should be the focus: a major importing region albeit with strict food safety requirements. Figure 1 depicts the tentative developments of the markets.

A specialised certified laboratory for oilseeds and edible oil can play an important role in a greater focus on export by standards setting, quality testing and by providing certified tests. The laboratory needs a clear mandate to fulfil this role; it needs a fair level of organisational and operational independency.

The result of the export strategy will be a strong increase of export of high value products, partly substituted by relatively cheap palm oil, which nevertheless constitute good cooking oil. The second option is 'business as usual' indicated as domestic oriented. In our view, this option will result in a declining sector, increased imports of palm oil and little prospects for NEOQCL.

Oilseed specialties and importing edible oil

The Myanmar's agricultural sector has a share of 36% in the total GDP of Myanmar; significantly higher than neighbouring countries. Crops account for 80% of the agricultural GDP. Oil crops cover around 20% of the agricultural land. Myanmar is the largest producer of sesame seed and sesame oil in the world. For groundnuts, it ranks sixth position and fourth position for groundnut oil. Eighty-five percent of the groundnuts and 96% of the sesame seeds are grown in Sagaing, Mandalay and Magway. Myanmar is not self-sufficient in edible oil in 2011; around one third was imported mainly as palm oil. Myanmar exports a small quantity of sesame seeds to China and to the high-end market Japan. No or almost no formal exports exist for other seeds and edible oils: almost all seeds and derived products are consumed domestically. Section 2.12 presents an overview of the properties, production and trade for all oilseeds.

Myanmar has a population of 56m that consumes on average between 10 and 15 kg of vegetal oil, which is below the world average of 26 kg. The consumption level in Myanmar is expected to increase coming years due to an increasing income and the relatively current low consumption level. ASEAN membership, liberalisation and openness of the economy will affect positively income growth. This however, will also lead to increasing competition of foreign products on the market, stimulated by the development within ASEAN.

Oilseed and edible oil value chain needs to be upgraded

In Myanmar, attempts have been made to improve the supply of quality seeds. On an experimental level, good results have been shown with varieties that had yields twice as high as actual yields. However, the implementation of such experiments was unsuccessful. The farmers face several constraints that impede them from growing crops efficiently. Among others, these are access to quality inputs and credit; land cannot be used as collateral to credit due to limited land rights; extension services are weak; and last but not least, farmers' competence of good agricultural practice needs to be strengthened. The limited supply base of raw materials either for processing oil or for exporting seeds is threatening a prosperous development of the oilseed sector. Nevertheless, the gross margins and the labour return of oilseeds are well above those of rice production.

Traders (collectors) and intermediaries seem to be working efficiently and competitively: their mark-ups range between 1 and 7% of the product value, depending on the services they provide. Of special interests are the seven Commodity Exchange Centres, located in the main production regions. The centres offer trading opportunities on samples of the produce and provide public price information on a weekly base. In Mandalay, 400 to 500 suppliers and 200 to 300 buyers take part daily in the trading. Institutionalised quality standards are lacking, though, as well as laboratories that can perform basic tests at reasonable costs quickly and on location. Now testing - at a fair level - is based on personal experiences by visual and sensory inspections.

The majority of oil millers in Myanmar have poor equipment (worn-out local and/or Chinese expellers) and operate on a small scale. They produce and sell crude oil in plastic bottles of different sizes. Furthermore, the equipment is underutilised and there is overcapacity because equipment is idle. The

availability of sufficient raw materials is seen as a major constraint. The Mandalay millers proposed cooperation with farmers (providing quality seeds) to tackle this constraint. Furthermore, the millers indicated the need to improve their competences and to modernise the equipment. They are eager to learn and are cooperative to their fellow millers. They expect a reduction in the number of millers. Except for the few front-runners, in general the Myanmar oilseeds and edible oil traders are weak in their international orientation on market windows, in complying with the international quality standards (e.g. FOSFA contracts) and in handling export procedures. Myanmar has high-value oilseeds and edible oils that can be exploited on the high-end consumer markets such as the EU, Japan and the USA.

'Doing business' environment and policies

Compared with doing business in neighbouring countries, doing business in Myanmar will need strong perseverance, focus and understanding from foreign investors. However, the ranking of doing business is in the range of several benchmark countries (i.e. also producers of sesame, groundnuts and/or mustard seeds). As Myanmar aims at liberalisation and openness of the economy, the country's legislation and governance are changing rapidly. The developments ahead are expected to improve the possibilities of doing business in Myanmar, reduce transaction costs and safeguard investments. Still, the infrastructure (logistics, flood control, electricity supply) is assessed as poor.

The three agricultural policy objectives of Myanmar are (i) food security, (ii) export promotion and (iii) increasing farmers' income and welfare. In order to achieve these objectives, more specific objectives have been set: achieving a surplus in rice production, reaching self-sufficiency in edible oils, and stepping up production of exportable pulses and industrial crops. Although the Government of Myanmar aims to challenge and support the agricultural sector, a study for USAID Myanmar mentioned 'unpredictable policies' as a major constraint.

The edible oil sector of Myanmar needs to deal with food safety issues. It is common practice to adulterate (intentionally debasing the quality and safety) domestically produced sesame and groundnut oils by mixing with imported other vegetal oils. The quality and safety of edible oils are not known due to the lack of standards and regulations on edible oils. Oil can be contaminated, mixed with other oils or the composition is unknown. Another food safety problem is the use of containers for transport and storage of edible oils, which have been used in the past for transport and storage of chemicals.

Strengths, Weaknesses, Opportunities and Threats (SWOT)

The strengths of the oilseeds and edible oil value chain are

1. Oil millers are aware of the need to update the equipment, are eager to learn and are willing to cooperate with farmers to increase the production.
2. Quality awareness is in development and exporters have access to certified quality laboratories.
3. The performance of collectors/wholesalers and Commodity Exchange Centres are proficient.

The weaknesses are:

1. Insufficient raw materials are produced, either for processing or for export.
2. Farmers lack sufficient resources and capabilities to increase the production, even though oilseeds have better margins than rice.
3. Oil millers are underutilising their out-of-date equipment.

The Myanmar oilseed product portfolio - based on sesame seeds and groundnuts - offers opportunities:

1. China has a growing demand for those products and the EU is a larger importer of those products.
2. Price differences of oil are depicted in Figure 1: Myanmar uses expensive oil as cooking oil while there are also cheaper substitutes that have at least a similar quality. Opportunities are:
   - Processing sesame seeds into oil. The value per tonne of oil is 2 to 3 times the level of seeds. Seeds contain around 50% oil of which 90% can be extracted by expellers.
   - Refined groundnut oil has a premium price of 17% on the world market.
   - Prepared groundnuts into snacks have a premium price of 80%.
   - Sesame oil is four times more expensive on the world market than palm oil: for each tonne of export of sesame oil, four tonnes palm oil can be imported. The potential economic benefit can be USD1bn.

The oilseeds sector has to handle some threats:

- Quality standards and quality consciousness are not well developed.
- Oilseeds and laboratories are not the priorities of the government.
- The institutional environment needs to be strengthened.

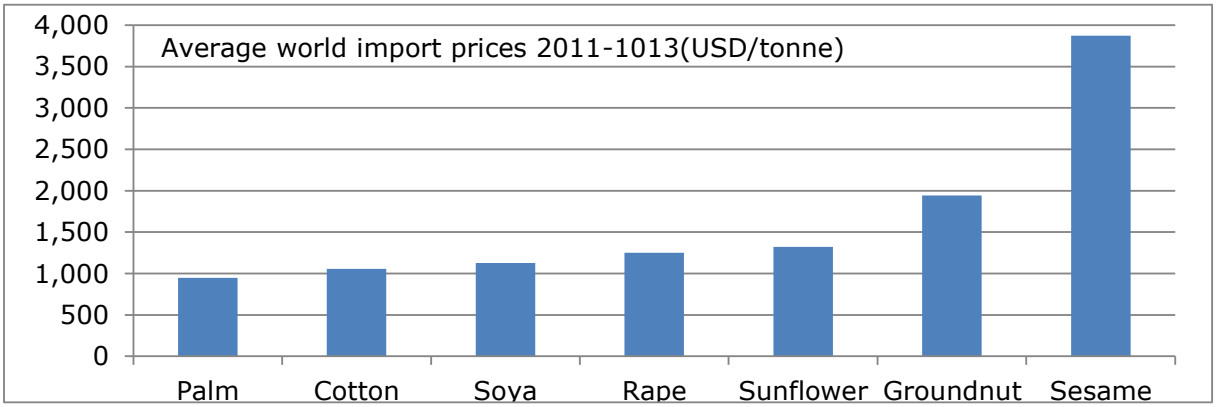


Figure 2 *Average prices of (crude) oils.*

Market windows: China is a nearby market and the EU pays premium prices

The Myanmar edible oilseed sector is recommended to focus on exploring the opportunities on two market windows:

1. China. It is a large nearby market with substantial imports and on which the quality standards are still moderate. This market can be used to gain experience with exporting.
2. EU. The EU has an import portfolio that includes almost all products from the Myanmar oilseed sector. This region pays a substantial premium price. By focusing on this market, crossover effects can be achieved. For buyer requirements on the EU market, it is recommended to start the orientation with studying the brochure of CBI 'EU Buyer requirements for vegetable oils and oilseeds'.

The domestic market in Myanmar is not seen as an attractive market window for sesame and groundnut oil. With more openness of the economy, which offers even more possibilities of importing palm oil, the competitiveness of the oil millers will undergo a strong pressure. We expect that this development is irreversible. Focusing on domestic demand will end in a declining oilseed and vegetable oil sector. In that case, the ambitions of value adding, self-sufficiency and strengthening of profitable and sustainable market for farmers will not be achieved.

Upgrading the oilseed and edible oil sector

To become a world market player at all levels of the supply chain - from seed breeders to exporters - a boost is needed: a higher, more efficient and market-oriented production. The private sector has to take the lead in the developments (see Figure 3). Furthermore, the enabling environment needs to develop at an even quicker pace: enhancing doing business at an international level, enforced quality standards and control, infrastructure and credit facilities. We recommend studying the feasibility of a sector development more in depth.

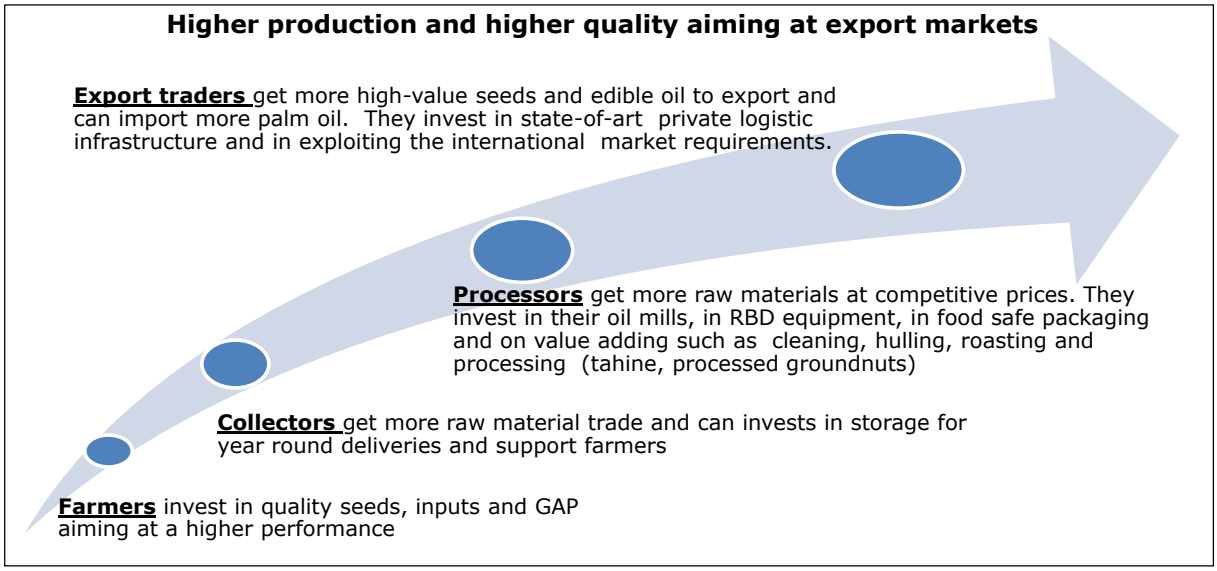


Figure 3 *Upgrading the oilseed and edible oil sector.*

Recommendations

We recommend supporting two selected but intertwined cases in Myanmar: one value chain focusing on export of high value seeds and one value chain restructuring the oil millers sector aiming at export of oil specialties. The EU should be the destination market and the product has to comply with the EU quality and food safety standards. The Dutch Government might consider supporting such cases.
The position and operational possibilities of NEOQCL have to be reconsidered. Ideally, the ministries, which are involved in the control and quality of oil crop products, have to reconsider the present roles of their involved laboratories and have to decide which role NEOQCL can play. A public-private partnership with the involved governments, the laboratories, the science sector and the edible oil and oilseeds sector can be a solution to discuss and to plan future actions. The presented business plan (Annex 6) shows a strategy and the conditions for a certified laboratory as NEOQCL.

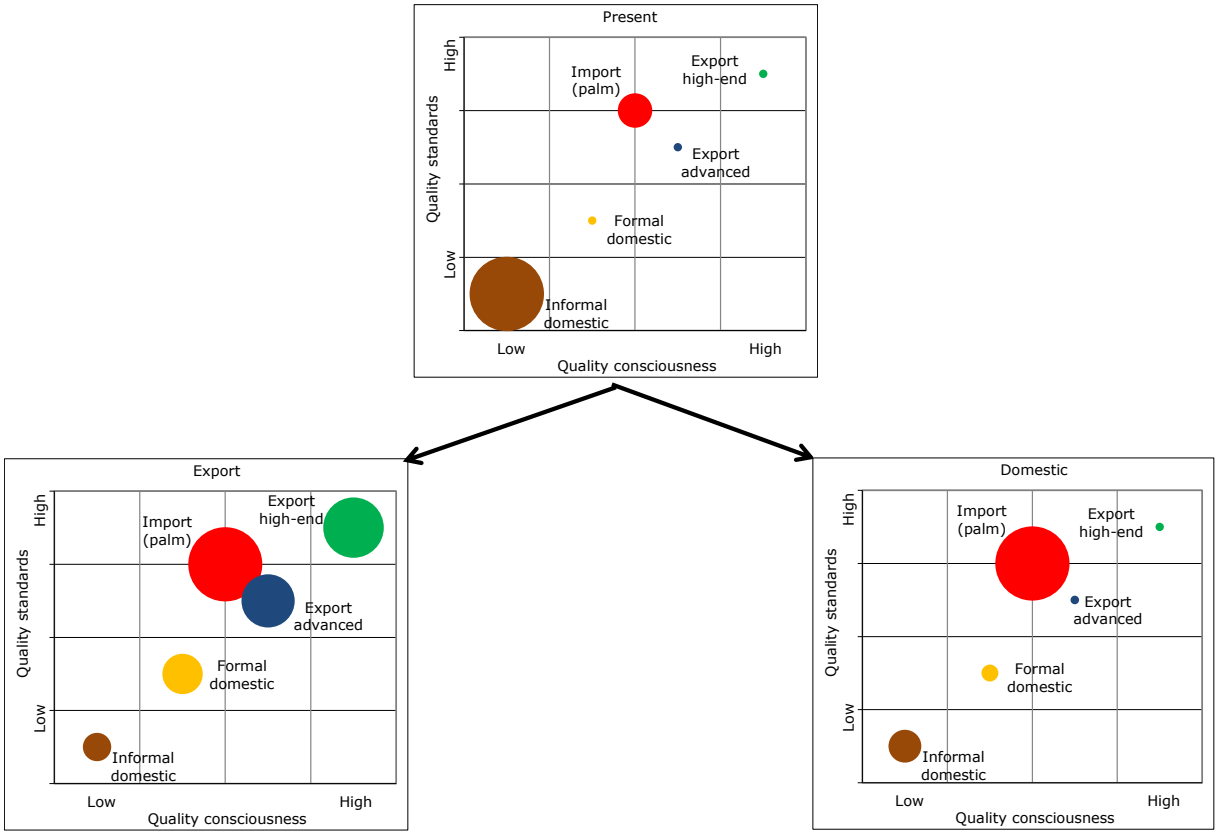
အနှစ်ချုပ်

ရည်ရွယ်ချက်နှင့်ချဉ်းကပ်မှုနည်းလမ်း

ဤလေ့လာချက်၏ ရည်ရွယ်ချက်မှာ မြန်မာနိုင်ငံ၏ အမျိုးသား စားသုံးဆီ အရည်အသွေးထိန်းချုပ်ရေး ဓာတ်ခွဲခန်းကို အထူး အလေးထားလျက် မြန်မာ့ဆီထွက်သီးနှံနှင့် စားသုံးဆီကဏ္ဍ၊ အခြားသက်ဆိုင်သည့် မြန်မာ့ အစားအစာ ဘေးအန္တရာယ် ကင်းရှင်းရေး စနစ် စသည်တို့နှင့်သက်ဆိုင်သည့် တစ်ကမ္ဘာလုံးဆိုင်ရာနှင့် ပြည်တွင်းဆိုင်ရာ စီးပွားရေးအခွင့်အလမ်းများကို လေ့လာဆန်းစစ်ရန်ဖြစ်သည်။ ချဉ်းကပ်မှုနည်းလမ်းမှာ ရိုးရှင်းလွယ်ကူသည့် SWOT analysis (အားသာချက်၊ အားနည်းချက်၊ အခွင့်အလမ်းနှင့်စိန်းခေါ်မှု/ခြိမ်းခြောက်မှု များကို စိစစ်သုံးသပ်ခြင်း) နည်းလမ်းဖြစ်ပြီး အခွင့်အလမ်းများကို စိစစ်ဖော်ထုတ်နိုင်စေမည်ဖြစ်သည်။ SWOT ကို အသုံးပြုရာတွင် ရုံးထိုင်သုတေသန (desk research)၊ ကိန်းဂဏာန်းအချက်အလက်များအား စိစစ်သုံးသပ်ခြင်း၊ မြန်မာနိုင်ငံရှိ စားသုံးဆီကဏ္ဍနှင့် အဓိက သက်ဆိုင်သူများနှင့် ဆွေးနွေးတိုင်ပင်ခြင်း စသည်တို့ကို အခြေခံလုပ်ဆောင်မည်ဖြစ်သည်။

နိဂုံးချုပ်

ဆွေးနွေးတိုင်ပင်ခဲ့သည့် အဓိကသက်ဆိုင်သူများသည် ပူးပေါင်းဆောင်ရွက်ရန် စိတ်အားထက်သန်ကြပြီး ၎င်းတို့၏ လုပ်ဆောင်ချက်များကို ပိုမိုတိုးတက်ကောင်းမွန်အောင် လုပ်ဆောင်ရန်လည်း အားတက်သရောရှိကြကာ ပြည်ပပို့ကုန်စျေးကွက်သို့ ထိုးဖောက်ဝင်ရောက်နိုင် ရန်လည်း မျှော်လင့်လျက်ရှိကြသည်။ ၎င်းတို့သည် ကုန်ကြမ်းပိုမိုကောင်းမွန်ရန်နှင့် တိုးတက်ထုတ်လုပ်ရန် လိုအပ်ချက်၊ တရားဝင်စံချိန်စံညွှန်းနှင့်စစ်ဆေးစမ်းသပ်မှုအတွက် လိုအပ်ချက် စသည်တို့ကို အလေးထားလုပ်ဆောင်လျက်ရှိသည်။



ပုံ-၁ မြန်မာ့ဆီထွက်သီးနှံကဏ္ဍ၏ တိုးတက်ပြောင်းလဲမှုအခြေအနေ

* ပူဖောင်းအရွယ်အစားများသည် စျေးကွက်အရွယ်အစားကို ဖော်ညွှန်းသည်။

မြန်မာ့ဆီထွက်သီးနှံနှင့် စားသုံးဆီကဏ္ဍကို ပြည်ပတင်ပို့မှုအတွက် အလေးထားလုပ်ဆောင်ရန် ထောက်ခံအကြံပြုကြပြီး ယင်းမှာ တောက်ပသောအနာဂတ်အတွက် အနည်းငယ်မျှသော ရွေးချယ်စရာအခွင့်အလမ်းများအနက်မှ တစ်ခုပင်ဖြစ်သည်။ ကောင်းစွာ လုပ်ပိုင်ခွင့်အပ်နှင့်ထားပြီး လုပ်ငန်းသဘောအရ လွတ်လပ်မှုရှိသော NEOQCL က ဤ ပို့ကုန် မဟာဗျူဟာကို ပံ့ပိုးထောက်ကူပေးနိုင်မည် ဖြစ်သည်။ လက်ရှိ အလေ့အထများကို ဆက်လက်ကျင့်သုံးခြင်းဖြစ်သည့် "သမားရိုးကျ စီးပွားရေးလုပ်ငန်း" သည် ဤကဏ္ဍကို ကသောင်းကနင်းဖြစ်စေနိုင်ပြီး အပြစ်ပယ်ခံ NEOQCL လည်းဖြစ်သွားနိုင်သည်။ တန်ဖိုးမြင့်ထုတ်ကုန်များကို ပြည်ပသို့တင်ပို့ခြင်းဖြင့် ဆီထွက်သီးနှံနှင့် စားသုံးဆီကဏ္ဍသည် နိုင်ငံခြားငွေ အမေရိကန်ဒေါ်လာ ၁ ဘီလီယံ (သန်းတစ်ထောင်)ခန့်ရရှိနိုင်ရန် အလားအလာရှိသော ထုတ်ကုန်အစုအဝေးတစ်ရပ်ဖြစ်သည်။ စားသုံးဆီအတွက် ပြည်တွင်းလိုအပ်ချက်ကို ဖြည့်ဆည်းရန် အရည်အသွေးပြည့်မီသည့် ဆားအုန်းဆီ များတင်ပို့ခြင်း၏ ကုန်ကျစရိတ်ကို ထုတ်နုတ်ပြီးလျှင်ပင် ယင်းထပ်ဆောင်းငွေများသည် မြန်မာ့ကုန်သွယ်ရေးလိုငွေပြမှုအတွက် အရေးပါလျက်ရှိသည်။ တန်ဖိုးကွင်းဆက်တစ်ခုလုံး အဆင့်မြှင့်တင်ပေးရန်လိုအပ်သော ပို့ကုန်မဟာဗျူဟာတစ်ရပ်ကို ယင်းကဏ္ဍအတွက် ရေးဆွဲရန်လိုအပ်သည်။ ကောင်းမွန်သော စိုက်ပျိုးရေးစနစ်များနှင့်တွဲဖက်လျှက် မျိုးစေ့အရည်အသွေးများမြှင့်တင်ပေးခြင်းသည် အရည်အသွေးမြင့်မားသော ဆီထွက်သီးနှံများ ပိုမိုထုတ်လုပ်နိုင်ရေးအတွက် အခြေခံပင်ဖြစ်သည်။ ဆီစက်ပိုင်ရှင်များကလည်း ၎င်းတို့၏ စက်ကိရိယာများကို အဆင့်မြှင့်တင်ရန်လိုအပ်ပြီး ထိရောက်သောထုတ်လုပ်မှုစွမ်းရည်ကိုလည်း မြှင့်တင်ရန်လိုအပ်သည်။ ဆီကြိတ်ခွဲခြင်း အပြင် အခွံနွှာခြင်း၊ လော်ခြင်း၊ မုန့်အဖြစ်အဆင့်အဆင့်ပြုပြင်ထုတ်လုပ်ခြင်း စသည့် လုပ်ငန်းအဆင့်ဆင့်တွင်လည်း အခွင့်အလမ်းများ ရရှိလာနိုင်သည်။ ပြည်ပတင်ပို့ရောင်းချသူများအနေဖြင့် အလယ်အလတ်အဆင့်အရည်အသွေးရှိသည့် ကုန်ပစ္စည်းများကို ၀ယ်လိုအား မြင့်မားလျက်ရှိသော အိမ်နီးချင်းတရုတ်နိုင်ငံသို့ တင်ပို့နိုင်ရန် ဦးစွာပထမ အလေးထားလုပ်ဆောင်သင့်သည်။ ထို့နောက် အစားအစာဘေးအန္တရာယ်ကင်းရေးဆိုင်ရာ တင်းကျပ်သည့် လိုအပ်ချက်စည်းမျဉ်းများရှိသော်လည်း ကုန်ပစ္စည်း အဓိက တင်သွင်းရာ ဒေသတစ်ခုဖြစ်သော ဥရောပသမဂ္ဂကို အဓိကထား လုပ်ဆောင်သင့်သည်။ ပုံ-၁ သည် ပြည်တွင်းဈေးကွက်နှင့် သွင်းကုန်၊ ပို့ကုန် ဈေးကွက်များ၏ တိုးတက်ပြောင်းလဲမှုအခြေအနေများကို ဖော်ညွှန်းထားခြင်းသည်။

စံချိန်စံညွှန်းသတ်မှတ်ခြင်း၊ အရည်အသွေးစမ်းသပ်ခြင်း၊ အသိအမှတ်ပြုစစ်ဆေးချက်များထုတ်ပေးခြင်း စသည်တို့ကို လုပ်ဆောင်ပေးခြင်း ဖြင့် ဆီထွက်သီးနှံနှင့် စားသုံးဆီဆိုင်ရာ အထူးအသိအမှတ်ပြု ဓာတ်ခွဲခန်းသည် ပြည်ပတင်ပို့မှုကို အဓိကထားလုပ်ဆောင်ရာတွင် အရေးပါသောအခန်းကဏ္ဍမှ ရပ်တည်နိုင်သည်။ ဤအခန်းကဏ္ဍကို ဖြည့်ဆည်းဆောင်ရွက်ပေးနိုင်ရန်အတွက် ဓာတ်ခွဲခန်းအနေဖြင့် ရှင်းလင်းပြတ်သားသော လုပ်ပိုင်ခွင့်ရှိရန် လိုအပ်သည်။ အဖွဲ့အစည်းနှင့်လုပ်ငန်းဆိုင်ရာ လွတ်လပ်မှုရှိရန်လိုအပ်သည်။

ပို့ကုန်မဟာဗျူဟာ၏ အကျိုးဆက်မှာ တန်ဖိုးမြင့်ထုတ်ကုန်များတင်ပို့မှု သိသိသာသာတိုးတက်မြင့်မားလာမည်ဖြစ်ပြီး ဈေးနှုန်းအသင့်အတင့် သက်သာသော စားအုန်းဆီကို တစ်စိတ်တစ်ပိုင်းအားဖြင့် အစားထိုးတင်သွင်းမည်ဖြစ်သည်။ သို့သော်လည်း ချက်ပြုတ်စားသုံးရန် ကောင်းမွန်သောဆီများဖြစ်ရမည်ဖြစ်သည်။ ဒုတိယရွေးချယ်ရမည့်နည်းလမ်းမှာ ပြည်တွင်းစားသုံးမှုကို အဓိကထားသော "သမားရိုးကျ စီးပွားရေးလုပ်ငန်း" ပင်ဖြစ်သည်။ ကျွန်ုပ်တို့၏ အမြင်အရ ဤရွေးချယ်စရာနည်းလမ်းမှာ စာအုန်းဆီတင်သွင်းမှုတိုးတက်လာပြီး NEOQCL အတွက် အောင်မြင်ထွန်းမှုအလားအလာနည်းပါးကာ ဆီထွက်သီးနှံကဏ္ဍကို ကျဆင်းစေမည်ဖြစ်သည်။

ဆီထွက်သီးနှံနှင့် စားသုံးဆီကဏ္ဍကို ခြုံငုံသုံးသပ်ခြင်း

မြန်မာနိုင်ငံ၏ စိုက်ပျိုးရေးကဏ္ဍသည် စုစုပေါင်းပြည်တွင်းထုတ်လုပ်မှု (GDP) ၏ ၃၆%ကို နေရာယူထားပြီး အခြားအိမ်နီးချင်းနိုင်ငံများထက် သိသိသာသာပိုမိုမြင့်မားလျက်ရှိသည်။ စိုက်ပျိုးရေး ကျိဒီပီတွင် သီးနှံကဏ္ဍက ၈၀% နေရာယူထားသည်။ ဆီထွက်သီးနှံများသည် စိုက်ပျိုးမြေ၏ ၂၀% ခန့် လွှမ်းခြုံထားသည်။ မြန်မာနိုင်ငံသည် ကမ္ဘာပေါ်တွင် နမ်းနှင့်နှမ်းဆီ အများဆုံးထုတ်လုပ်သော နိုင်ငံဖြစ်သည်။ မြေပဲနှင့်ပတ်သက်၍လည်း အဆင့် (၆) နေရာတွင်ရပ်တည်နေပြီး မြေပဲဆီနှင့်ပတ်သက်၍ အဆင့်လေးနေရာတွင် ရပ်တည်လျက်ရှိသည်။ မြေပဲ ၈၅%နှင့် နှမ်း ၉၆% မှာ စစ်ကိုင်း၊ မွန္တလေးနှင့် မကွေးတိုင်းဒေသကြီးတို့တွင် စိုက်ပျိုးကြသည်။ မြန်မာနိုင်ငံသည် ၂၀၁၁ ခုနှစ်တွင် စားသုံးဆီ ပြည်တွင်းစားသုံးမှု ဖူလုံခြင်းမရှိပေ။ သုံးပုံတစ်ပုံခန့်မှာ စားအုန်းဆီများကို ပြည်ပမှ အဓိကမှာယူတင်သွင်းနေရသည်။ မြန်မာနိုင်ငံသည် ပမာဏအနည်းငယ်မျှသော နှမ်းများကို တရုတ်နှင့် အဆင့်မြင့်ဈေးကွက်ဖြစ်သော ဂျပန်သို့ တင်ပို့လျက်ရှိသည်။ အခြားဆီထွက်သီးနှံ သို့မဟုတ် စားသုံးဆီများကို လုံး၀ သို့မဟုတ် လုံး၀နီးပါး ပြည်ပသို့ တရား၀င်တင်ပို့ခြင်းမရှိပေ။ ဆီထွက်သီးနှံ အားလုံးနီးပါးနှင့် ဆက်စပ်ထုတ်ကုန်များကို ပြည်တွင်းတွင်သာ စားသုံးလျက်ရှိသည်။ အခန်း ၂.၁ တွင် ဆီထွက်သီးနှံအားလုံးအတွက် ပိုင်ဆိုင်မှု၊ ထုတ်လုပ်မှုနှင့် ကုန်သွယ်မှုဆိုင်ရာ ခြုံငုံသုံးသပ်ချက်ကို ဖော်ပြထားသည်။

မြန်မာနိုင်ငံသည် လူဦးရေ (၅၆)သန်းရှိပြီး ပျမ်းမျှဆီစားသုံးမှုနှုန်းမှာ ၁၀-၁၅ ကီလိုဂရမ်ရှိကာ ကမ္ဘာ့ဆီစားသုံးမှု ပျမ်းမျှနှုန်း ၂၆ ကီလိုဂရမ်ထက် လျော့နည်းလျက်ရှိသည်။ လက်ရှိစားသုံးမှုပမာဏမှာ နိမ့်ကျလျက်ရှိသေးသဖြင့် ၎င်ငွေတိုးတက်လာပါက မြန်မာနိုင်ငံရှိ စားသုံးမှုနှုန်းမှာ လာမည့်နှစ်များအတွင်း ပိုမိုတိုးတက်လာရန် မျှော်လင့်ရသည်။ အာဆီယံအဖွဲ့၀င်ဖြစ်ခြင်း၊ စီးပွားရေးလွတ်လပ်ပွင့်လင်းလာခြင်းတို့ကြောင့် ၎င်ငွေတိုးတက်မှုကို အပြုသဘော သက်ရောက်စေမည်ဖြစ်သည်။ သို့သော်လည်း ဤအခြေအနေများသည် အာဆီယံဒေသတွင် ဖွံ့ဖြိုးတိုးတက်မှုက ပြဋ္ဌာန်းပေးလိုက်သော ဈေးကွက်၌ နိုင်ငံခြားဖြစ်ထုတ်ကုန်များ၏ ပြိုင်ဆိုင်မှုမှာလည်း မြင့်မားလာမည်ဖြစ်သည်။

ဆီထွက်သီးနှံနှင့် စားသုံးဆီတန်ဖိုးကွင်းဆက်

မြန်မာနိုင်ငံတွင် အရည်အသွေးမြင့်မျိုးစေ့များ ထုတ်လုပ်ဖြန့်ဖြူးနိုင်ရန် ကြိုးပမ်းအားထုတ်ခဲ့ကြပြီးဖြစ်သည်။ လက်တွေ့စမ်းသပ်မှုအဆင့်တွင် မျိုးခွဲများကို စမ်းသပ်ရာ၌ အမှန်တကယ်အထွက်နှုန်းထက် နှစ်ဆခန့်ပိုမိုထွက်ရှိသည်ကို တွေ့ရှိရသည်။ သို့သော်လည်း ယင်းစမ်းသပ်ချက်များကို လက်တွေ့အကောင်အထည်ဖော်ရာတွင် အောင်မြင်မှုမရရှိပေ။ တောင်သူများအနေဖြင့် သီးနှံများကို ထိထိရောက်ရောက်စိုက်ပျိုးရာတွင် အခက်အခဲများစွာနှင့်ရင်ဆိုင်ကြရသည်။ ယင်းအခက်အခဲများမှာ အရည်အသွေးပြည့်မီသည့် သွင်းအားစုများနှင့် ချေးငွေရရှိနိုင်မှု၊ မြေယာအခွင့်အရေးအကန့်အသတ်ကြောင့် ချေးငွေရရှိနိုင်ရန် လယ်ယာမြေကို အပေါင်အာမခံပစ္စည်း အဖြစ် အသုံးမပြုနိုင်ခြင်း၊ ပညာပေးလုပ်ငန်းများ အားနည်းခြင်း၊ ကောင်းမွန်သော စိုက်ပျိုးရေးအလေ့အကျင့်များကို ကျင့်သုံးနိုင်ရန် လယ်သမားများ၏ စွမ်းဆောင်ရည်ကို မြှင့်တင်ပေးရန်လိုအပ်ခြင်း စသည်တို့ဖြစ်သည်။ စားသုံးဆီကြိတ်ခွဲရန်အတွက် သို့မဟုတ် ဆီးထွက်သီးနှံများ ပြည်ပတင်ပို့ရောင်းချရန်အတွက် ကုန်ကြမ်းပစ္စည်းရရှိနိုင်မှု အကန့်အသတ်ရှိနေခြင်းသည် အောင်မြင်တိုးတက်လာမည့် ဆီထွက်သီးနှံကဏ္ဍကို ခြိမ်းခြောက်လျက်ရှိသည်။ သို့သော်လည်း စုစုပေါင်းအသားတင်အမြတ်နှင့်လုပ်အားခတို့မှာ ဆန်စပါးထုတ်လုပ်မှုထက် လွန်စွာမြင့်မားလျက်ရှိသည်။

ကုန်သည်များနှင့်ပွဲစားများသည် ထိထိရောက်ရောက် အပြိုင်အဆိုင်လုပ်ဆောင်နေသည့် အရိပ်လက္ခဏာတွေ့ရပြီး ၎င်းတို့လုပ်ဆောင်ပေးရသည့် ၀န်ဆောင်မှုအပေါ်မူတည်၍ ထုတ်ကုန်တန်ဖိုး၏ ၁% မှ ၇% အထိ အမြတ်ယူကြသည်။ အထူးစိတ်၀င်စားစရာကောင်းသည်မှာ အထိက ထုတ်လုပ်မှုဒေသများတွင်တည်ရှိသည့် ကုန်စည်ဒိုင် (၇) ခုပင်ဖြစ်သည်။ ယင်းကုန်စည်ဒိုင်များသည် ကုန်ပစ္စည်းနမူနာများကို ကုန်သွယ်နိုင်မည့် အခွင့်အလမ်းများကိုပေးပြီး အပတ်စဉ် ဈေးနှုန်းသတင်းအချက်အလက်များကိုလည်း ပံ့ပိုးပေးလျက်ရှိသည်။ မွန္တလေးမြို့ရှိ ရောင်း၀ယ်ဖောက်ကားမှုတွင် ရောင်းချသူ ၄၀၀-၅၀၀ ဦးခန့်နှင့် ၀ယ်ယူသူ ၂၀၀-၃၀၀ ဦးခန့် ပါ၀င်လုပ်ဆောင်လျက်ရှိသည်။ အဖွဲ့အစည်းလိုက်သတ်မှတ်ထားသည့် အရည်အသွေးစံချိန်စံညွှန်းသတ်မှတ်ချက်များ ကင်းမဲ့လျက်ရှိပြီး အခြေခံစမ်းသပ်ချက်များကို သင့်တင့်သောဈေးနှုန်းဖြင့် သက်ဆိုင်ရာဒေသတွင် လုပ်ဆောင်နိုင်မည့် ဓာတ်ခွဲခန်းများလည်း ကင်းမဲ့လျက်ရှိသည်။ လက်ရှိအခြေအနေတွင် စမ်းသပ်ခြင်းလုပ်ငန်းများကို တစ်ကိုယ်ရေ အတွေ့အကြုံများအပေါ် အခြေခံလျက် အမြင်နှင့်အခြားအသိအာရုံဖြင့် စစ်ဆေးချက်များကိုသာ လုပ်ဆောင်နေရသည်။

မြန်မာနိုင်ငံရှိ ဆီစက်ပိုင်ရှင်အများစုမှာ အရည်အသွေး ညံ့ဖျင်းသည့် စက်ပစ္စည်းများ (ဟောင်းနွမ်းစုပ်ပျက်နေသည့် ဒေသဖြစ်နှင့် သို့မဟုတ် တရုတ်ဖြစ် expeller စက်များ) သာ ပိုင်ဆိုင်ကြပြီး အသေးစားလုပ်ငန်းအဆင့်သာ လည်ပတ်လျက်ရှိသည်။ ဆီကြမ်းများကိုသာထုတ်လုပ်ပြီး ပလပ်စတစ်ပုလင်းအမျိုးမျိုးဖြင့်ထည့်ကာ ရောင်းချလျက်ရှိသည်။ ထို့အပြင် စက်များကို လိုအပ်သလောက် ကောင်စွာအသုံးပြုနိုင်ခြင်း မရှိပေ။ စက်များ လည်ပတ်ခြင်းမရှိသဖြင့် စက်စွမ်းအားများမှာ အပိုဖြစ်လျက်ရှိသည်။ လုံလောက်သည့် ကုန်ကြမ်းရရှိနိုင်ရေးကို အဓိက အခက်အခဲအဖြစ် ရှုမြင်ကြသည်။ ယင်းအခက်အခဲကို ဖြေရှင်းရန်အတွက် မွန္တလေးဆီစက်ပိုင်ရှင်များသည် လယ်သမားများနှင့် (အရည်အသွေးကောင်းသော မျိုးစေ့များပံ့ပိုးပေးကာ) ပူးပေါင်းဆောင်ရွက်လျက်ရှိသည်။ ထို့အပြင် စက်ပိုင်ရှင်များသည် ၎င်းတို့၏ စွမ်းဆောင်ရည်များကို မြှင့်တင်ရန်နှင့် စက်ပစ္စည်းများကို ခေတ်မီအောင် လုပ်ဆောင်ရန် လိုအပ်လျက်ရှိသည်ကို ဖော်ပြခဲ့ကြသည်။ ၎င်းတို့သည် လေ့လာသင်ယူရန် စိတ်အားထက်သန်လျက်ရှိကြပြီး လုပ်ဖော်ကိုင်ဖက်စက်ပိုင်ရှင်များနှင့် ပူးပေါင်းဆောင်ရွက်လျက် ရှိကြသည်။ စက်ပိုင်ရှင်အရေအတွက် လျော့ကျသွားမည်ဟု ထင်မြင်မျှော်လင့်ကြသည်။

ထိပ်ပိုင်းပုဂ္ဂိုလ်အနည်းကလွဲ၍ မြန်မာ့ဆီထွက်သီးနှင့်စားသုံးဆီကုန်သည်များသည် နိုင်ငံတကာအရည်အသွေး စံချိန်စံညွှန်းများနှင့်အညီ လိုက်နာဆောင်ရွက်ကာ ပို့ကုန်လုပ်ထုံးလုပ်နည်းများကို ကိုင်တွယ်လုပ်ဆောင်လျက် ဈေးကွက်ထွက်ပေါက်များတွင် နိုင်ငံတကာသို့ ဦးတည်လုပ်ဆောင်ရာ၌ အားနည်းလျက်ရှိကြသည်။ မြန်မာနိုင်ငံတွင် ဥရောပသမဂ္ဂ၊ ဂျပန်၊ အမေရိကန်ပြည်ထောင်စု စသည့် အဆင့်မြင့် ဈေးကွက်များသို့ တင်ပို့ရောင်းချနိုင်သည့် တန်ဖိုးမြင့် ဆီထွက်သီးနှံနှင့် စားသုံးဆီများရှိသည်။

စီးပွားရေးလုပ်ငန်းလုပ်ဆောင်ခြင်းဆိုင်ရာ ပတ်ဝန်းကျင်နှင့်မူဝါဒများ

အိမ်နီးချင်းနိုင်ငံများတွင် စီးပွားရေးလုပ်ငန်းများလုပ်ကိုင်ဆောင်ရွက်ခြင်းနှင့်နှိုင်းယှဉ်ပါက မြန်မာနိုင်ငံ၌ စီးပွားရေးလုပ်ငန်းလုပ်ကိုင်ခြင်းသည် ဇွဲကောင်းခြင်း၊ အလေးထားလုပ်ဆောင်ခြင်းနှင့် နိုင်ငံခြားရင်းနှီးမြှုပ်နှံသူများထံမှ နားလည်မှုရရှိခြင်း စသည်တို့လိုအပ်သည်။ သို့သော်လည်း စီးပွားရေးလုပ်ငန်း လုပ်ကိုင်ခြင်းအဆင့်သတ်မှတ်ချက်သည် များစွာသော ရည်ညွှန်းအမှတ် နိုင်ငံများ (ဆိုလိုသည်မှာ နှမ်း၊ မြေပဲနှင့်/ သို့မဟုတ် မုန်ညင်းစေ့ ထုတ်လုပ်သူများ) သတ်မှတ်ချက်ဘောင်အတွင်းတွင် တည်ရှိနေသည်။ မြန်မာနိုင်ငံအနေဖြင့် စီးပွားရေး လွတ်လပ်ပွင့်လင်းမှုကို ရည်ရွယ်လုပ်ဆောင်လျက်ရှိသဖြင့် နိုင်ငံ၏ ဥပဒေပြုရေးနှင့်အုပ်ချုပ်ရေးကဏ္ဍများမှာ လျှင်မြန်စွာပြောင်းလဲလျက် ရှိသည်။ အနာဂတ်တွင်ဖြစ်ပေါ်လာမည့် တိုးတက်ပြောင်းလဲမှုများသည် မြန်မာနိုင်ငံတွင် စီးပွားရေးလုပ်ကိုင်ဆောင်ရွက်ခြင်းကို တိုးတက်ကောင်းမွန်လာရန်၊ အဆင့်ဆင့်ကုန်ကျစရိတ်များ လျော့ကျလာရန်နှင့် ရင်းနှီးမြှုပ်နှံမှုများကို အကွာအကွယ်ပေးရန် မျှော်လင့်ရသည်။ အခြေခံအဆောက်အအုံများ (ထောက်ပံ့ပို့ဆောင်မှု၊ ရေကြီးမှုထိန်းချုပ်ရေး၊ လျှပ်စစ်မာတ်အားဖြန့်ဖြူးမှု) ညံ့ဖျင်းလျက်ရှိနေသေးကြောင့် စိစစ်တွေ့ရှိရသည်။

မြန်မာနိုင်ငံ၏ စိုက်ပျိုးရေးမူဝါဒရည်မှန်းချက် (၃)ရပ်မှာ (၁) စားနပ်ရိက္ခာဖူလုံရေး၊ (၂) ပြည်ပပို့ကုန်တိုးမြှင့်တင်ပို့ရေးနှင့် (၃) တောင်သူများ၏ ဝင်ငွေနှင့် အကျိုးစီးပွားတိုးမြင့်လာရေးတို့ဖြစ်သည်။ ယင်းရည်မှန်းချက်များ ပြီးမြောက်အောင်မြင်ရေးအတွက် နောက်ထပ်အသေးစိတ် ရည်မှန်းချက်များကို ချမှတ်ခဲ့သည်။ ယင်းတို့မှာ ဆန်စပါးပိုလျှံအောင်ထုတ်လုပ်နိုင်ရေး၊ စားသုံးဆီ ပြည်တွင်းစားသုံးမှုဖူလုံရေးနှင့် ပြည်ပပို့ကုန် ပဲမျိုးစုံနှင့်စက်မှုကုန်ကြမ်းသီးနှံများ တိုးတက်ထုတ်လုပ်ရေး စသည်တို့ဖြစ်သည်။ မြန်မာအစိုးရအနေဖြင့် စိုက်ပျိုးရေးကဏ္ဍကို ထောက်ပံ့ရန် ရည်ရွယ်ထားသော်လည်း USAID Myanmar ၏ လေ့လာချက်တွင် မတည်ငြိမ်သည့်မူဝါဒများက အဓိက အဟန့်အတားများဖြစ်သည်ဟု ဖော်ပြခဲ့သည်။

မြန်မာ့ စားသုံးဆီကဏ္ဍသည် အစားအစာဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ ပြဿနာရပ်များကို ဖြေရှင်းရန် လိုအပ်လျက်ရှိသည်။ ပြည်တွင်းထုတ် နှမ်းနှင့် မြေပဲဆီများကို ပြည်ပမှတင်သွင်းသော အခြားဟင်းသီးဟင်းရွက်ဆီများဖြင့်ရောနှောကာ အရည်အသွေးညံ့ဖျင်းအောင် ရည်ရွယ်ချက်ရှိရှိလုပ်ဆောင်ခြင်းမှာ ပုံမှန်ကိစ္စရပ်တစ်ခုဖြစ်နေသည်။ စားသုံးဆီဆိုင်ရာ စံချိန်စံညွှန်းသတ်မှတ်ချက်နှင့် စည်းမျဉ်းသတ်မှတ်ချက်များ မရှိသဖြင့် စားသုံးဆီများ၏ အရည်အသွေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းမှုအခြေအနေမှာ မသိရှိနိုင်ပေ။ ဆီကို အခြားဆီများနှင့်ရောနှောထားနိုင်သည်။ သို့မဟုတ်ပါကလည်း ဆီတွင် မည်သည့်အရာများပါဝင်သည်ကို မသိရှိနိုင်ပေ။ အခြားသော ဘေးအန္တရာယ်ကင်းရေးပြဿနာတစ်ရပ်မှာ ယခင်က ဓာတုဆီများ သယ်ယူသိုလှောင်ထားသည့် ပုံးများဖြင့် စားသုံးဆီများကို သယ်ယူသိုလှောင်ခြင်းပင်ဖြစ်သည်။

အားသာချက်၊ အားနည်းချက်၊ အခွင့်အလမ်းနှင့် ခြိမ်းခြောက်မှု/ စိန်ခေါ်မှုများ (SWOT)

ဆီထွက်သီးနှံနှင့် စားသုံးဆီ တန်ဖိုးကွင်းဆက်၏ အားသာချက်များမှာ

(၁) ဆီစက်ပိုင်ရှင်များသည် စက်ပစ္စည်းများကို ခေတ်မီအောင် လုပ်ဆောင်ရန် လိုအပ်ချက်ကို သိရှိပြီး လေ့လာသင်ယူရန် စိတ်အား ထက်သန်မှုရှိကာ ထုတ်လုပ်မှုတိုးတက်မြင့်မားလာစေရန်အတွက် တောင်သူများနှင့် ပူးပေါင်းလုပ်ဆောင်ရန် လိုလားလျက်ရှိသည်။

(၂) အရည်အသွေးဆိုင်ရာ ပညာပေးလုပ်ငန်းမှာ တိုးတက်လျက်ရှိပြီး ပြည်ပတင်ပို့ရောင်းချသူများအနေဖြင့် အသိအမှတ်ပြု အရည်အသွေးဆိုင်ရာ ဓာတ်ခွဲခန်းများကို လက်လှမ်းမီနိုင်သည်။

(၃) လက်ကားဈေးရောင်းချသူများနှင့် ကုန်စည်ဒိုင်များ၏ စွမ်းဆောင်ရည်မှာ ကောင်းမွန်မှုရှိသည်။

အားနည်းချက်များမှာ

(၁) အဆင့်ဆင့်ပြုပြင်ထုတ်လုပ်မှု သို့မဟုတ် ပြည်ပတင်ပို့မှုအတွက် ကုန်ကြမ်းပစ္စည်းလုံလောက်စွာ မထုတ်လုပ်နိုင်ပေ။

(၂) ဆီထွက်သီးနှံသည် စပါးထက် အမြတ်အစွန်းပိုမိုရရှိနိုင်သော်လည်း ထုတ်လုပ်မှုတိုးမြှင့်ရန်အတွက် တောင်သူများတွင် လုံလောက်သော အရင်းအမြစ်နှင့် စွမ်းဆောင်ရည်များ ကင်းမဲ့လျက်ရှိသည်။

(၃) ဆီစက်လုပ်ငန်းရှင်များက ၎င်းတို့၏ ခေတ်မမီတော့သည့် စက်ပစ္စည်းများကို စွမ်းအားရှိသလောက် အသုံးပြုနိုင်ခြင်းမရှိပေ။

နှမ်းနှင့် မြေပဲကို အခြေခံထားသော ဆီထွက်သီးနှံနှင့် စားသုံးဆီထုတ်ကုန် အစုအဝေးတစ်ရပ်သည် အခွင့်အလမ်းများကို မွေးမြူးပေးလျက်ရှိသည်။

(၁) ယင်းထုတ်ကုန်များအတွက် တရုတ်ပြည်၏ ဂယ်လိုအားသည် ကြီးထွားလျက်ရှိပြီး ဥရောပသမဂ္ဂသည် ပိုမိုကြီးမားသည့် တင်သွင်းသူဖြစ်သည်။

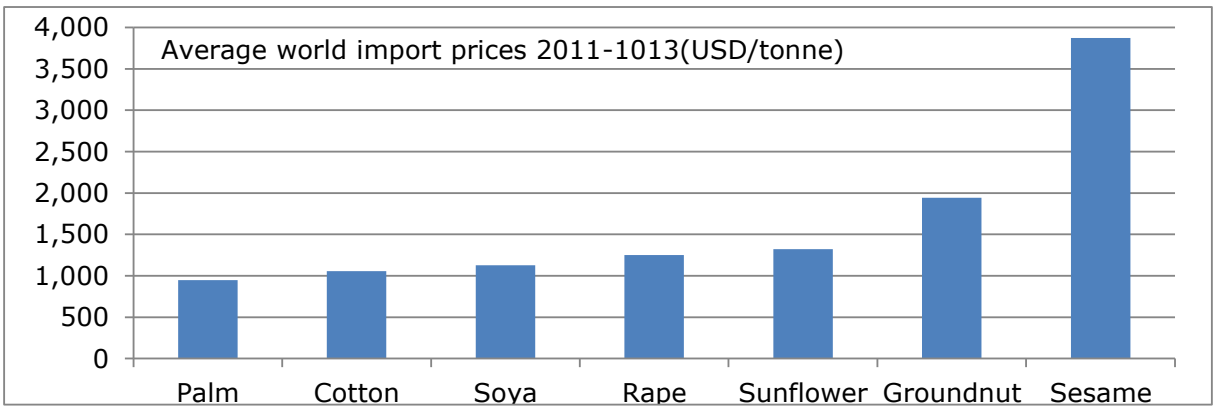
(၂) ဈေးနှုန်းကွာခြားချက်များကို ပုံ-၁ တွင် ပြသထားသည်။ မြန်မာနိုင်ငံသည် အရည်အသွေးကွာခြားချက်နည်းပြီး ဈေးနှုန်းသက်သာသည့် အစားထိုးအသုံးပြုနိုင်သော ဆီများရှိသော်လည်း ဈေးနှုန်းကြီးမြင့်သော ဆီများကို အသုံးပြုလျက်ရှိသည်။ အခွင့်အလမ်းများမှာ -

- နှမ်းကို ဆီအဖြစ်ကြိတ်ခွဲခြင်း။ ဆီတစ်တန်ဈေးနှုန်းသည် နှမ်းဈေးနှုန်း၏ ၂ ဆမှ ၃ ဆုံးအထိ မြင့်မားနေသည်။ နှမ်းတွင် ဆီ ၅၀%အထိ ပါဝင်ပြီး ယင်းတို့အနက် ၉၀% ကို expeller ဖြင့်ပင် ကြိတ်ခွဲရယူနိုင်သည်။

- သန့်စင်ပြီး မြေပဲဆီသည် ကမ္ဘာ့ဈေးကွက်တွင် ၁၇ ရာခိုင်နှုန်းသော ပရီမီယံဈေးနှုန်းကို ရရှိထားသည်။
- မုန့်အဖြစ်ပြင်ဆင်ပြုလုပ်ထားသော မြေပဲသည် ၈၀ ရာခိုင်နှုန်းသော ပရီမီယံဈေးနှုန်းကို ရရှိထားသည်။
- ကမ္ဘာ့ဈေးကွက်တွင် နှမ်းဆီဈေးနှုန်းသည် စားအုန်းဆီဈေးနှုန်းထက် လေးဆမျှ ပိုမိုဈေးကြီးသည်။ နှမ်းဆီ တစ်တန်တင်ပို့နိုင်ပါက စားအုန်းဆီ ၄ တန်ပြန်လည်တင်သွင်းနိုင်သည်။ ဖြစ်နိုင်ခြေစီးပွားရေးအကျိုးအမြတ်မှာ အမေရိကန်ဒေါ်လာ (၁) ဘီလီယံ (သန်းတစ်ထောင်) ဖြစ်သည်။

ဆီထွက်သီးနှံကဏ္ဍသည် ခြိမ်းခြောက်မှုအချို့ကို ကိုင်တွယ်ဖြေရှင်းရမည်ဖြစ်သည်။

- အရည်အသွေးစံချိန်စံညွှန်းသတ်မှတ်ချက်များနှင့် အရည်အသွေးဆိုင်ရာ နိုးကြားသိရှိမှု ကောင်းစွာ ဖွံ့ဖြိုးခြင်းမရှိပေ။
- ဆီထွက်သီးနှံနှင့် ဓာတ်ခွဲခန်းများသည် အစိုးရ၏ ဦးစားပေးအစီအစဉ် မဟုတ်ပေ။
- အဖွဲအစည်းဆိုင်ရာ ပတ်ဂန်းကျင်ကို စွမ်းဆောင်ရည် မြှင့်တင်ပေးရန် လိုအပ်လျက်ရှိသည်။



ပုံ-၂ ဆီ (အကြမ်း) ပျမ်းမျှဈေးနှုန်းများ

ဈေးကွက်ထွက်ပေါက်များ

ဈေးကွက်ထွက်ပေါက်နှစ်ရပ်တွင်ရှိသော အခွင့်အလမ်းများအား ရှာဖွေရေးကို အဓိကထားလုပ်ဆောင်ရန် မြန်မာ့ စားသုံးဆီကဏ္ဍကို အကြံပြုထောက်ခံထားသည်။

(၁) တရုတ်နိုင်ငံ - သွင်းကုန်များကို အထိုက်အလျောက်အများအပြားတင်သွင်းလျက်ရှိသော ကြီးမားသည့် အနီးကပ်ဈေးကွက်တစ်ရပ်ဖြစ်သည်။ အရည်အသွေးစံချိန်စံညွှန်းများမှာလည်း အလယ်အလတ်အဆင့်တွင့်သာ ရှိသေးသည်။

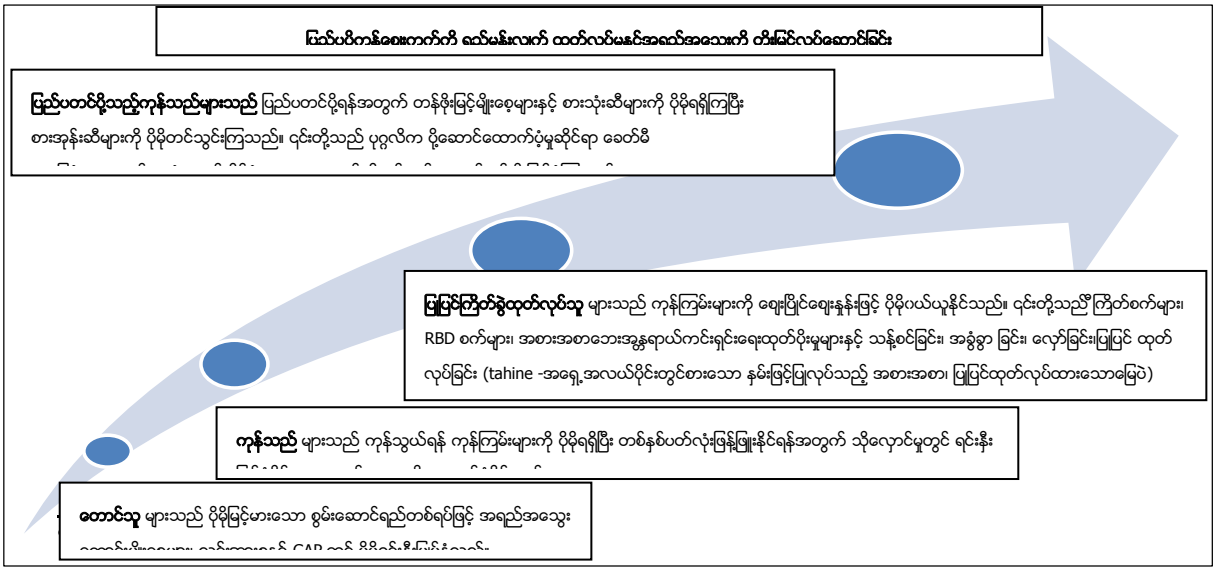
(၂) ဥရောပသမဂ္ဂ - မြန်မာ့ဆီထွက်သီးနှံကဏ္ဍမှ ထွက်ကုန်အားလုံးနည်းပါးပါဝင်သည့် သွင်းကုန်အစုအဝေးတစ်ရပ် ရှိနေသည်။ ယင်းဒေသသည် များပြားသည့် ပရီမီယံဈေးနှုန်းကိုလည်း ပေးစွမ်းနိုင်သည်။ ဤဈေးကွက်ကို အလေးပေးလုပ်ဆောင်ခြင်းဖြင့် ကောင်းကျိုးများစွာရရှိနိုင်သည်။ ဥရောပသမဂ္ဂဈေးကွက်နှင့်ပတ်သက်၍ ၀ယ်ယူသူများ၏ လိုအပ်ချက်များနှင့်စပ်လျဉ်းပြီး CBI "ဟင်းသီး ဟင်းရွက်ဆီများနှင့် ဆီထွက်သီးနှံဆိုင်ရာ ၀ယ်ယူသူများ၏ လိုအပ်ချက်များ" လက်ကမ်းစာစောင်ကို စတင် ဦးတည်လေ့လာရန် ထောက်ခံအကြံပြုသည်။

မြန်မာနိုင်ငံ၏ ပြည်တွင်းဈေးကွက်မှာ နှမ်းနှင့်မြေပဲဆီများအတွက် စွဲဆောင်မှုရှိသော ဈေးကွက်တစ်ရပ်အဖြစ် မရှုမြင်ပေ။ စားအုန်းဆီများ ပိုမိုတင်သွင်းရန် ဖြစ်နိုင်ခြေများပင်ရှိလာနိုင်သည့် ဈေးကွက်ပိုမိုပွင့်လင်းလာမှုနှင့်အတူ ဆီစက်ပိုင်ရှင်များအနေဖြင့် ပိုမိုပြင်းထန်သော ဖိအားတစ်ရပ်နှင့် ရင်ဆိုင်ရမည်ဖြစ်သည်။ ဤတိုးတက်ပြောင်းလဲမှုမှာ ပြောင်းလဲ၍ ရနိုင်မည်မဟုတ်ဟု မျှော်လင့်ရသည်။ ပြည်တွင်းဈေးကွက်ကိုသာ အလေးပေးလုပ်ဆောင်နေခြင်းသည် ဆီထွက်သီးနှံနှင့် ဟင်းသီးဟင်းရွက်ဆီ ကဏ္ဍအတွက် ကျဆင်းမှုနှင့်သာ အဆုံးသတ်ပေလိမ့်မည်။ ဤကိစ္စတွင် တန်ဖိုးမြှင့်ထုတ်ကုန်ထုတ်လုပ်ရေး၊ ပြည်တွင်းစားသုံးမှုဖွံ့ဖြိုးရေး၊ အကျိုးအမြတ်ဖြစ်ထွန်းပြီး ရေရှည်တည်တံ့အောင်မြင်သော ဈေးကွက်ကို ပိုမိုခိုင်မာအောင်လုပ်ဆောင်ခြင်း စသည့် ရည်မှန်းချက်များကို ပြည်မီလိမ့်မည် မဟုတ်ပေ။

ဆီထွက်သီးနှံနှင့် စားသုံးဆီကဏ္ဍကို မြှင့်တင်ခြင်း

မျိုးစပ်သူများမှ ပြည်ပတင်ပို့ရောင်းချသူများအထိ တန်ဖိုးကွင်းဆက်အဆင့်တိုင်းတွင် ကမ္ဘာ့ဈေးကွက်မောင်းနှင်သူဖြစ်လာစေရန်မှာ မြှင့်တင်လုပ်ဆောင်မှု တစ်ရပ်လိုအပ်သည်။ ယင်းမှာ သာလွန်ကောင်းမွန်သော ဈေးကွက်ကို ဦးတည်ထုတ်လုပ်ခြင်းပင်ဖြစ်သည်။

ယင်းတိုးတက်ပြောင်းလဲမှု (ပုံ-၃) ကို ပုဂ္ဂလိကကဏ္ဍမှ ဦးဆောင်မှုအခန်းကဏ္ဍကို ရယူရမည်ဖြစ်သည်။ ထို့အပြင် နိုင်ငံတကာအဆင့်တွင် စီးပွားရေးလုပ်ကိုင်မှုကို တိုးမြှင့်ဆောင်ရွက်ခြင်း၊ အာမခံချက်ရှိသည့် အရည်အသွေးစံချိန်စံညွှန်းများနှင့်ထိန်းချုပ်မှုများ၊ အခြေခံအဆောက်အအုံနှင့် ချေးငွေပံ့ပိုးမှု စသည်တို့ကို လုပ်ဆောင်နိုင်သည့် ပတ်ဝန်းကျင်တစ်ရပ် အချိန်တိုအတွင်း တည်ဆောက်ရန် လိုအပ်သည်။ ဤကဏ္ဍဖွံ့ဖြိုးတိုးတက်ရေးအတွက် ဖြစ်နိုင်ခြေလေ့လာမှုကို ပိုမိုနက်နက်ရှိုင်းရှိုင်းလုပ်ဆောင်ရန် ကျွန်ုပ်တို့မှ ထောက်ခံအကြံပြုပါသည်။



ပုံ-၃ ဆီထွက်သီးနှံနှင့် စားသုံးဆီကဏ္ဍအား တိုးတက်မြင့်မားအောင်လုပ်ဆောင်ခြင်း

ထောက်ခံအကြံပြုချက်များ

မြန်မာနိုင်ငံတွင် အပြန်အလှန်ဆက်နွယ်နေသည့် အထူးရွေးချယ်ထားသည့် လုပ်ငန်းနှစ်ရပ်ကို ပံ့ပိုးလုပ်ဆောင်ရန် ထောက်ခံအကြံပြုပါသည်။ ယင်းလုပ်ငန်းနှစ်ရပ်မှာ တန်ဖိုးမြင့်မျိုးစေ့များ ပြည်ပတင်ပို့မှုကို အလေးထားလုပ်ဆောင်သည့် တန်ဖိုးကွင်းဆက်တစ်ခုနှင့် အထူးထုတ်လုပ်ထားသောဆီကို ပြည်ပတင်ပို့ရန် ရည်ရွယ်လျက် ဆီစက်လုပ်ငန်းရှင်များ၏ ကဏ္ဍကို ပြန်လည်တည်ဆောက်ခြင်းဆိုင်ရာ တန်ဖိုးကွင်းဆက်တစ်ခုတို့ဖြစ်သည်။ ဥရောပသမဂ္ဂ (အီးယူ) သည် နောက်ဆုံးဈေးကွက်တစ်ခုဖြစ်သင့်ပြီး ထုတ်ကုန်များသည်လည်း အီးယူ အရည်အသွေးနှင့် အစားအစာဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ စံချိန်စံညွှန်းများနှင့်အညီ ဖြစ်ရမည်ဖြစ်သည်။ ဒတ်ချ်အစိုးရသည် ယင်းလုပ်ငန်းရပ်များကို ထောက်ပံ့ပေးကောင်းပေးမည်ဖြစ်သည်။

NEOQCL ၏ အခန်းကဏ္ဍနှင့် လုပ်ငန်းဆိုင်ရာ ဖြစ်နိုင်ခြေများကို ပြန်လည်စဉ်စားသုံးသပ်ရမည်။ စံပြလုပ်ဆောင်မှုအခြေအနေတွင် ဆီထွက်သီးနှံထွက်ကုန်များ ထိန်းချုပ်ရေးနှင့်အရည်အသွေးဆိုင်ရာ လုပ်ငန်းတွင်ပါဝင်သော ပန်ကြီးဌာနများသည် ၎င်းတို့ပါဝင်ဆောင်ရွက် လျက်ရှိသော ဓာတ်ခွဲခန်း၏ လက်ရှိအခန်းကဏ္ဍကို ပြန်လည်သုံးသပ်ရမည်ဖြစ်ပြီး NEOQCL သည် မည်သည့်အခန်းကဏ္ဍက ပါဝင်လုပ်ဆောင်နိုင်မည်ကိုလည်း ဆုံးဖြတ်ရမည်ဖြစ်သည်။ ပါဝင်ဆောင်ရွက်သည့် အစိုးရဌာနများဖြင့် အစိုးရ-ပုဂ္ဂလိက ပူးပေါင်းဆောင်ရွက်မှု၊ ဓာတ်ခွဲခန်းများ၊ သိပ္ပံကဏ္ဍ၊ စားသုံးဆီနှင့် ဆီထွက်သီးနှံကဏ္ဍ စသည်တို့သည် အနာဂတ်လုပ်ငန်းစဉ်များ ဆွေးနွေး ရေးဆွဲရန်အတွက် ဖြေရှင်းချက်တစ်ရပ်ဖြစ်နိုင်သည်။ တင်ပြထားသော လုပ်ငန်းအစီအစဉ် (နောက်ဆက်တွဲ - ၆) သည် NEOQCL အဖြစ်လုပ်ဆောင်မည့် အသိအမှတ်ပြုဓာတ်ခွဲခန်းအတွက် မဟာဗျူဟာနှင့် အခြေအနေများကို ဖော်ပြထားသည်။

1 Introduction

1.1 Background

The aim of the study is to assess the global and domestic business opportunities of the Myanmar oilseed and edible oil sector and of the relevant Myanmar's food safety control system (legislation and institutions). The FAO (2009) investigated the oilseed sector in the first decade of this century and supported the establishment of a National Edible Oil Quality Control Laboratory (NEOQCL), an organisational part of the Ministry of Agriculture and Irrigation. The laboratory has been built and equipped. The mission of the NEOQCL is to promote food safety and quality of edible oils in Myanmar. Its objective is to build confidence in quality measurements by the development of validated methods, reference measurements, inter-laboratory comparisons and training. The institute will provide scientific evidence and guidance to support Myanmar oil quality policies, standards and international trade. The NEOQCL will play a major role on the improvement of the quality of imported/exported oils and on the reduction of fraudulence practices.

However, first, the future position of this laboratory and the designated tasks and responsibilities of the different government bodies involved are not yet clear. Even though the laboratory is equipped with modern analytical instruments, it is operating on a rather basic level. The laboratory staff needs to receive additional training to get practical experience and obtain proficiency particularly with specialised equipment assigned to them. There is an immediate need for further support to the NEOQCL to make it fully operational and in compliance with ISO 17025.

Second, the viability of the NEOQCL depends not only on the state of the art of equipment and proficiency of the trained staff. The demand from the edible oil sector for services provided by this laboratory is also an important driver. According to the FAO (2009), the oilseed sector of Myanmar is heavily regulated on all levels of the chain resulting in severe distortions. Myanmar is a net importer of edible oil (mainly palm) but also a producer of high value oilseeds and oil of e.g. sesame seeds and groundnuts. Myanmar's government has shown more openness to the world market and implemented a more liberal economic policy. Furthermore, the demand for oils and fats will increase rapidly if incomes increase. In 2009, Myanmar's consumption per capita was around 10 to 15 kg, whereas the world average was 26 kg in 2012. This offers the oilseed sector the opportunity to add value to its products (e.g. to meet the domestic demand and substituting imports or by exporting high value seeds or oils). It also enables it to cooperate with Dutch (or global) operating companies.

Third, the legislative and institutional environment can enhance the development of the sector: for the international market, food-safety issues are of major importance. Many of these sophisticated export markets of high-value oilseed products demand increasingly food-safety management systems. The edible oil laboratory can play a crucial role in these challenging compliance issues. Specific attention is needed to map the responsibilities of the different ministries and to explore whether collaboration in training with other laboratories is possible.

To conclude: the long-run viability of this laboratory is unclear as on the one hand the needs of the (private) edible oil sector are unclear and on the other hand the competencies and training of the staff needs to be strengthened. In addition, the supply of inputs (among others laboratory chemicals) seems to be troublesome. This impedes Myanmar from exploiting the full potential of foreign trade and investment in their edible oil sector.

1.2 Goal

The objective of this study is to identify the long-run economic viability of Myanmar NEOQCL laboratory. More specific:

1. The study assesses the global and domestic business opportunities of the Myanmar oilseed and edible oil sector as this will be the market for NEOQCL.
2. The NEOQCL will have to operate within the frame of the Myanmar food-safety control system (legislation and institutions). Therefore, the study assesses the relevant food safety system.
3. The study outlines a business plan for NEOQCL based on the present status of implementation of food safety legislation, trade policy, willingness and capability of the Myanmar edible oil sector to use the laboratory for the control of their products.

1.3 Approach and activities

The opportunities of the Myanmar Oilseed sector are assessed by a straightforward strategic management approach that has proven its value for similar opportunities assessment assignments. The basic elements consists of deriving the Key Success Factors of business opportunities in a Strengths-Weaknesses-Opportunities and Threats (SWOT) framework. In the study, the opportunities for the domestic Myanmar market are analysed. The viability of the NEOQCL is addressed specifically, including the Key Success Factors (among others staff competences and market demand for quality assessments).

To assess the opportunities and Key Success Factors (KSF) we executed the following activities:

1. The first phase of the analysis consisted of a desk study into the value chain, the supply and demand of oilseeds and edible oil, government policies, the institutional environment of the oilseed sector including the (possible) role and tasks of the NEOQCL. This desk research included a review of relevant literature and analysis of databases (among others from FOAstat and UNComtrade).
2. A fact-finding mission was undertaken by the Dutch experts (see Annex 1 for the programme and consulted stakeholders). During this mission, production bottlenecks, logistics and market intelligence as well as the relevant laboratories and the functioning of institutions (e.g. food safety agencies) were considered. The stakeholders consulted were:
    a. Direct beneficial and responsible officials for the NEOQCL i.e. Dr.Khin Moe Kyaw, head of the NEOQCL.
    b. Representatives on all levels of the value chain from production to consumptions such as private enterprises (input suppliers (seeds and chemicals), producers, traders, processors, and international operating firms) as well as professional organisations.
    c. Representatives of the enabling and supporting environment. These are the national and local policy makers of the government on food safety, public health, agriculture and economic development and trade.
3. The first findings were presented to and discussed with stakeholders from the edible oil sector. The aim of this presentation was to inform stakeholders on the findings and evaluate the findings.
4. After these activities, we drafted a report with the findings without confidential information for a general audience. Part of this report (Annex 6) is a business plan for NEOQCL.

1.4 Data

In this report, we use several databases depending on the focus. Generally, we use international databases, covering all countries in the world to compare Myanmar with other countries. Two important databases are:

1. FAOstat for production yields and food balances. The food balance database has a time lag: the last year is 2011. This time lag restricts including developments that are more recent. Production values are up-to-date until 2013.
2. UNcomtrade for international trade data. This database provides information on quantity and value (and hence price) of import and export. The database is up-to-date until 2013, however for some

countries information is lagging for 2013. In those cases we use 2012 or the average of 2011 and 2012.

3. World development indicators and Doing Business indicator from the World bank for comparisons between countries on other variables.

For data information specific to Myanmar, we will use local databases especially from Myanmar. The references are mentioned in the text.

1.5 Country profile

The Republic of the Union of Myanmar, commonly shortened to Myanmar is a sovereign state in Southeast Asia bordered by Bangladesh, India, China, Laos and Thailand. In 1989, the military government renamed the country: 'Burma' became 'Myanmar'. Burma continues to be used in English by the governments of e.g. the United Kingdom, United State and Canada. One third of Myanmar's total border of 1,930 kilometres forms a coastline along the Bay of Bengal and the Andaman Sea. Myanmar's population, of over 55m, makes it the world's 24th most populous country. The population is rather young: 26% is younger than 14 years and 45% younger than 24 years. With 653,290 square kilometres it is the world's 39th largest country and it ranks 65th on the area of agricultural land in 2011 (CIA World Fact book). The GDP per capita is low compared to the Netherlands: USD1,700 in Myanmar compared to USD41,400 (purchasing power parity) in the Netherlands. However, the real GDP grew fast at 6 to 7%, whereas the Dutch real GDP declined in that period.

Table 1.1
Key-facts of Myanmar and the Netherlands.

Indicator	Myanmar	Netherlands
Population	55.7m Annual Growth rate 2001-2011: 0.8% Urban population :32%	16.7m Annual Growth rate 2001-2011: 0.4% Urban population: 87%
Capital/largest city	Naypyidaw 930,000 inhabitants Largest city Rangoon 4,6m	Amsterdam 740,000 inhabitants
Climate	Tropical monsoon (see below)	Temperate; marine; cool summers and mild winters
Terrain	Central lowlands ringed by steep, rugged highlands Altitudes 0 m to 5,881 m	Mostly coastal lowland and reclaimed land Altitudes: -7 to 322 m
Land Area	65.3m ha	3.4m ha
Agricultural land	12.6m ha, 19% of land area Arable land 16%, permanent crops 2% of land area	1.9m ha, 57% of land area Arable land 31%, permanent crops 1% of land area
GDP in 2013	USD59.43bn (USD111.1bn purchasing power parity (PPP))	USD800bn, (USD696.3bn purchasing power parity (PPP))
Real GDP-growth	Annual growth rates 2011 to 2013: between 5.9 and 6.8%	Annual growth rates 2011 to 2013: ranging between-1.2 and 0.9
Origin value added in GDP	Agriculture: 38%, industry: 20%, services: 42%	Agriculture 2%, industry 24% and services 74%
GDP/capita	USD1,700(PPP)	USD41,400 (PPP)
Currency (11-08-2014)	Myanmar Kyat (MMK) 1,000MMK= 0.76EUR = USD1.02	Euro (EUR or €) EUR1= MMK1,300 = USD1.34
Exports 2013	*Value:* USD9bn *Products:* natural gas, wood products, pulses, beans, fish, rice, clothing, jade and gems *Partners:* Thailand 40.7%, India 14.8%, China 14.3%, Japan 7.4%	*Value:* USD551bn *Products:* machinery and equipment, chemicals, fuels; foodstuffs. *Partners*: Germany 26.5%, Belgium 13.7%, France 8.8%, UK 8%, Italy 4.5%
Imports 2013	*Value:* USD10bn *Products:* fabric, petroleum products, fertiliser, plastics, machinery, transport equipment; cement, construction materials, crude oil; *Partners:* China 36.9%, Thailand 20.2%, Singapore 8.7%, South Korea 8.7%, Japan 8.2%, Malaysia 4.6%	*Value:* USD478bn *Products:* machinery and transport equipment, chemicals, fuels, foodstuffs, clothing *Partners:* Germany 13.8%, China 12%, Belgium 8.4%, UK 6.7%, Russia 6.4%, US 6.1%

Sources: World Development Indicators; Wikipedia: CIA The world Fact book; oanda currency converter

Myanmar is a member of the Association of Southeast Asian Nations (ASEAN), a political and economic organisation of ten countries located in Southeast Asia. It was formed on 8 August 1967 by Indonesia, Malaysia, the Philippines, Singapore and Thailand, after which Brunei, Cambodia, Laos, Myanmar and Vietnam became members. Its aims include accelerating economic growth, social progress, socio-

cultural evolution among its members, protection of regional peace and stability, and opportunities for member countries to discuss differences peacefully (http://www.asean.org/asean/about-asean/overview). More openness and trade liberalisation (not only to ASEAN countries) might have far-reaching impact on the agriculture sector. On the one hand, competition will increase by imports of goods (palm oil is one example), on the other hand, it offers opportunities for exporting high value products (seeds or edible oil). Unfortunately, little literature is available on trade integration, let alone on which products will lose or gain in that integration process (FAO, 2013a).

1.6 Economy, agriculture and benchmark countries

Myanmar's economy depends strongly on agriculture compared to its neighbouring countries and certainly also to the Netherlands: its share in GDP is relatively high. For comparison: the share of agriculture in GDP in Myanmar is 38% and in the Netherlands it is 2%. This applies also to employment. Within Myanmar agriculture, crops have a major share, in 2009 crop production constituted 80% of agricultural GDP. The livestock and fishery sector counts each for 9% and forestry for 1% (Shwe, 2011b). In this section, we will focus on crops and especially on oilseeds.
In the next chapters, we will compare Myanmar with the neighbouring countries India and China, with Thailand -a neighbouring country and member of ASEAN- and with attractive high value markets: Japan, European Union and the USA. The latter provide opportunities for exports.
Rice is the major crop in Myanmar; it covers 40% of the 18.6m ha of cropland, followed by dry beans (14.5% of cropland) and third sesame seed (8.5%). Oilseeds cover around 20% of total crop area and are important crops that have higher margins than rice. In the following chapters, we will discuss the oilseed crops extensively.

Table 1.2
Share of agriculture in country's GDP and employment and GDP per capita (2013)

	GDP per capita		Agriculture, value added		Employment in agriculture	
	(current USD)	Annual growth (%)*	(% of GDP)	Year	(% of total employment)	Year
World	10,514	1.5	3.1	2011	30.5	2010
Myanmar	1,700	Not available	38.0	2013	70.0	2013
China	6,807	9.6	10.0	2013	34.8	2011
India	1,499	6.1	18.2	2013	47.2	2012
Japan	38,492	0.8	1.2	2012	3.7	2010
United States	53,143	0.9	1.2	2011	1.6	2010
European Union	34,244	0.7	1.5	2013	5.1	2012
Thailand	5,779	3.4	12.0	2013	39.6	2012

* Annual growth from 2003 to 2013 based on GDP USD 2005

Source: World Bank Development Indicators, Myanmar is taken from CIA the world fact book

Agro-climate conditions
Myanmar can be divided in four agro-climatic conditions and characteristics:

1. The Delta Region characterised by the highest population density, highest land productivity (mostly alluvial soil), moderately high rainfall and generally flat topography.
2. The Coastal Region with the smallest land area but the highest annual rainfall, exceeding 4,000 mm per annum, and, accordingly, this region is highly suitable for growing perennial crops, such as coconut, palm oil and rubber.
3. The Central Dry Zone Region with the lowest annual rainfall, sandy soils, and which has the second highest population density.
4. The mountainous region with the largest land area characterised by dense forest. This region accounts for about 34.4m ha or about half of the total land area. It has poor road infrastructure, and low population density.

There are three distinct seasons in Myanmar: the summer (hot and dry) from mid-February to mid-May, the rainy season from mid-May to mid-October, and a winter (or cold season with temperature ranging from 20°C to below zero degree) from mid-October to mid-February. The southwest monsoon provides the major source of rainfall for the country (Lin, ca. 2007, Shwe, 2011a).

2 Oilseeds: properties, production, consumption and international trade

2.1 Myanmar's oilseeds and edible oil production

2.1.1 Oilseeds acreage and production

Sesame seeds and groundnuts in Myanmar rank as the third and fourth crop in acreage. Myanmar is specialised in sesame but also in mustard seeds: the share of both crops is 17 respectively 15% of the world area far above the 2.5% share of Myanmar in world's agriculture land. In addition, the productivity of both crops is also above world average, resulting in even higher share in the quantity produced. Myanmar ranks in the world at the first positon for sesame seed production, sixth for its groundnut and third for its mustard seed production. Sunflowers, cottonseeds and soya beans rank also in the top 20 of the acreage in Myanmar, but have a small to a negligible share in the world acreage. Coconut is even less significant in acreage; however, the share in the world production is slightly higher than of soya beans and cotton; the coconut yield/ha is twice the world average.

Table 2.1

Area, production and yield of the major oilseed crops in Myanmar in 2013

Crops Name	Rank in area	Area 1,000 Ha	Area %-age of total area	Area %-age of world	Production 1,000 ton	Production %-age of world	Yield kg/ha	Yield in% world level
Rice, paddy	1	7,500	40.2	4.5	28,000	3.8	3,733	83
Beans, dry	2	2,700	14.5	9.2	3,800	16.4	1,407	178
Sesame seed	3	1,590	8.5	16.9	890	18.7	560	111
Groundnuts in shell	4	890	4.8	3.5	1,375	3.0	1,545	87
Pigeon peas	5	650	3.5	10.5	900	19.0	1,385	182
Sunflower seed	6	570	3.1	2.2	360	0.8	632	36
Maize	7	470	2.5	0.3	1,700	0.2	3,617	66
Seed cotton	9	330	1.8	0.9	425	0.6	1,288	65
Soya beans	16	167	0.9	0.2	205	0.1	1,228	49
Mustard seed	20	105	0.6	14.9	91	15.9	867	107
Coconuts	28	42	0.2	0.3	425	0.7	10,119	198
All crops		18,600		2.5				

Source: Calculations based on FAOstat.

Although not listed in the FAO statistics (Table 2.1), according to Favre and Myint (2009, p67-68), also niger seed and oil palm are grown in Myanmar. In 2006/2007 these crops covered 4% (130,000 ha) and 3% (80,000ha) of total area of oilseed crops. Both crops covered a larger area than mustard seeds (65,000 ha) in 2006/2007. The annual report of the Ministry of Agriculture (Cited from (Kyaw, 2013)) indicated the area of niger seeds at 150,000 ha in the years 2010 to 2012, far above the level of mustard seeds. The total production was around 120,000 tonnes. This level is almost 2/3 of the production level of Ethiopia, renowned for its niger production.

2.1.2 Position of Myanmar in the world of edible oil production

Myanmar is a rather small producer of edible oils in the world: its share is 0.5%. According to the FAO statistics, it has no production in palm oil and rapeseed and a negligible production of soya bean oils. Palm, soya and rape oils are the top 3 world's largest edible oil sources. However, Myanmar is the largest producer of sesame oil, almost 27% of the world production. Second is China with 18%. For groundnuts oil, Myanmar's share in world production is 4.5%, which makes it the fourth producer in the world after China (38%), India (24%) and Nigeria (14%). Both products can be seen as oilseed specialties, due its small volumes and the special applications.

Table 2.2

Production of vegetal oil in the world and Myanmar in 2012

Oil from	World 1,000 tonnes	Tonnes	Myanmar % in world
Palm	53,270		
Soya bean	41,538	29,736	0.07
Rapeseed	23,570		
Sunflower	14,947	120,823	0.81
Palm kernel	6,045		
Cottonseed	5,301	39,875	0.75
Groundnut	5,170	234,000	4.53
Olive virgin	3,320		
Coconut (copra)	3,305	28	0.00
Maize	2,351		
Sesame	1,278	341,000	26.69
Linseed	544		
Safflower	145		
Total	160,782	765,462	0.48

Source: Based on FAOstat.

2.1.3 Oilseed and vegetal oil properties

In this section, a concise overview of the properties and applications of each oil and oilseed is presented. The focus is on the saturated and unsaturated oil composition. The advantage of mono-unsaturated fatty acids is the lower melting point, but a higher oxidative stability than the poly-unsaturated fatty acids. For food application, poly-unsaturated fatty acids reduce storability, as these oils turn rancid more quickly. Especially the trend towards liquid plant-based frying oil increases the demand for high mono-unsaturated oil. Frying oils with a high mono-saturated fatty content are preferred over poly saturated, because of the higher oxidative stability (does not get rancid easily and can withstand higher temperatures). In fatty acid composition, sunflower oil is a substitute for sesame and groundnut oil, even with a lower saturated fatty acid level.

Table 2.3

Composition of seeds and oils

	Seeds		Oils composition in% of total oil		
	Protein (%)	Oil content (%)	Saturated	Mono-unsaturated	Poly-unsaturated
Coconut			86.5	5.8	1.8
Cottonseed			93.6	1.5	0.6
Groundnut	25.8	49.2	12.8	49.6	31.6
Mustard seed	26.1	36.2	5.5	62.1	27.8
Palm			49.3	37.0	9.3
Sesame	17.5	49.6	14.1	37.9	44.0
Soya bean	36.5	19.9	14.5	22.1	56.4
Sunflower	20.8	51.5	8.7	36.0	45.0

Source: National Nutrient Database for Standard Reference, USDA.

Several stakeholders in Myanmar mentioned palm oil as inferior oil. With regard to the composition, relative high level of mono- unsaturated and a low level of poly-unsaturated fatty acids, it is a better oil for frying than groundnut or sesame oil. Compared to coconut and cottonseed oil, the level of saturated fatty acids is preferable for palm oil. Mustard oil has a high level of mono-saturated fatty acids, but also a relatively high level of poly-unsaturated fatty acids. For dressings, cold pressed oil from groundnuts or sesame are preferred, due to the taste, flavour and high levels of poly-unsaturated fatty acids.

In the sections below, we will discuss each oilseed and oil in more detail.

2.2 Production and consumption of oil crops and vegetal oils

2.2.1 Production and consumption

Myanmar is not self-sufficient in vegetal oil and is a net importer: in 2000, the self-sufficiency was 57%, increasing to 68% in 2011 and peaking in 2010 at 72%. The total domestic supply doubled in that period. The quantity of vegetal oil used for food consumption grew, but less strongly than for other utilisations. The later grew as fast as the total production. 'Other utilisation' in Myanmar is - according to several consulted stakeholders - the use of edible oil in restaurants and in the food (e.g. noodles) industry. This definition differs from the FAO, which defines other utilisation as non-food consumption. The vegetal oil supply for food consumption increased from 6.4 in 2000 to 8.7 kg/capita/year in 2011. Keeping in mind that a large share of other utilisation is, in the end, also consumed as (processed) food, the vegetable oil consumption might be double the statistics of the FAO: between 12 and 18 kg/capita. This level is more in line with the opinion of several stakeholders we met during our fact-finding mission: they mentioned 15 kg/head.

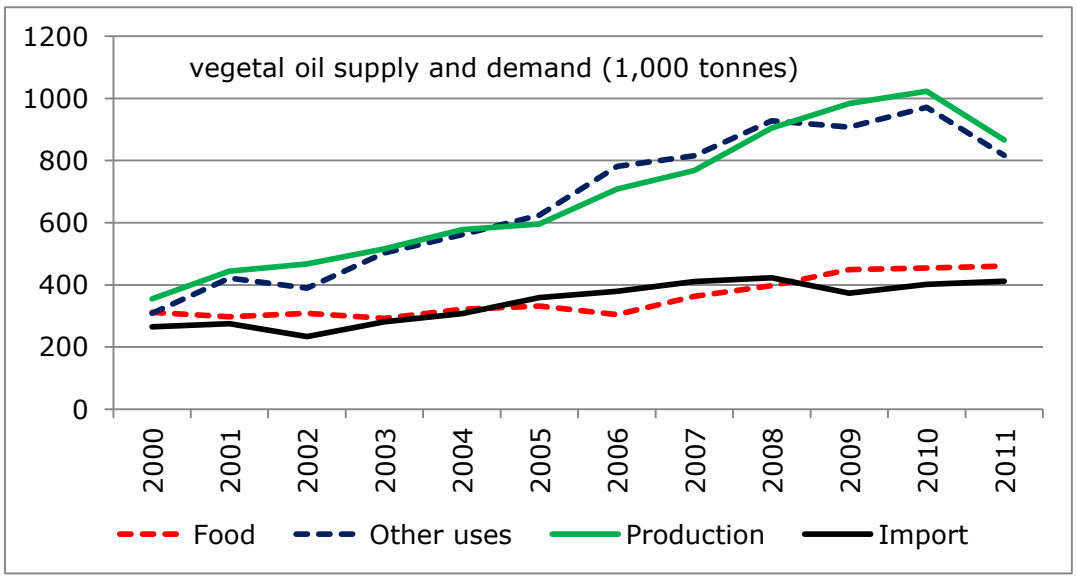


Figure 2.1 *Supply and demand of vegetal oil in Myanmar.*
Source: FAOstat Food Balance Sheet.

The main domestic supplied oils in 2011 are oils from sesame seeds, groundnuts and sunflower seeds. However, the import of palm oil counts for the largest share in the total domestic supply. Other oil crops supply a minor part. The production as well as the import doubled the period 2001 to 2011. Production of rice barn oil and the import of 'other' vegetal oil decreased in that period. Annex 2.1 provides the data for all products. The export levels of edible oils are negligible: together the exports fell below 1,000 tonnes consisting of solely sesame oil with an exception of an export of 2,000 tonnes of coconut oil in 2002. In the period 2001 to 2011, the import of palm oil accounts on average for 30% of domestic supply (ranging from 24 to 34%), sesame oil for 22% and furthermore groundnuts and sunflower seeds each for 15%. These four products contributed in 2000 75% of Myanmar's vegetal oil supply, increasing to 89% in 2011. In the FAO statistics, the production of around 33,000 tonnes niger seeds oil is in not included (Kyaw, 2013).

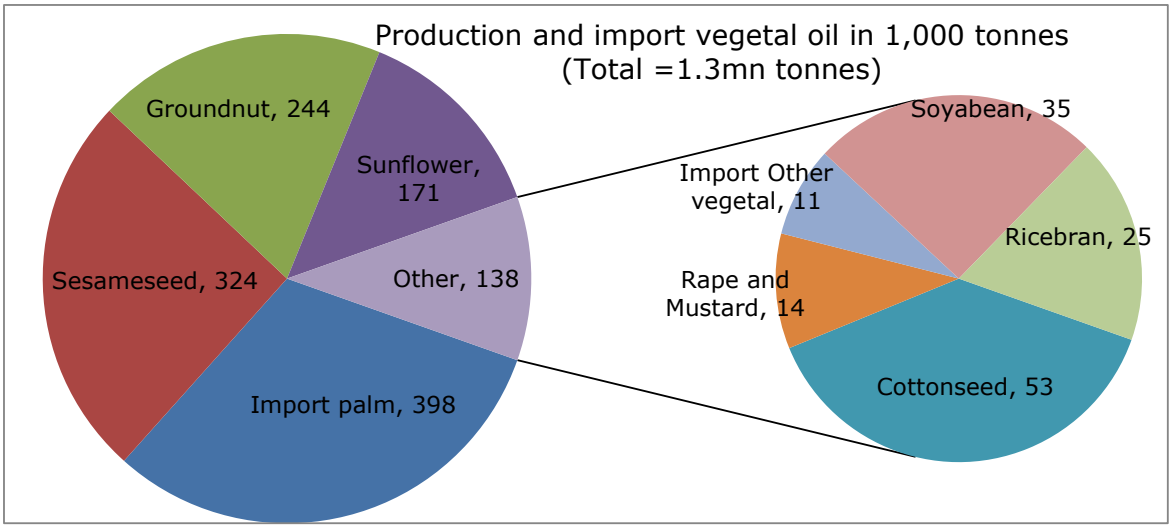


Figure 2.2 *Myanmar's production and imports of vegetal oil in 2011.*
Source: Based on FAOstat Food Balance Sheet.

2.2.2 Oilseeds balances

The Myanmar food supply consisting of oil crops (in primary equivalent) increased from 6.7 in 2000 to 12.2 kg/capita/year in 2011. The supply reached its top in 2008 with 14.3 kg/capita/year (FAOstat). The increased production is the main source of the higher level of food supply: export takes only a small share of the production and import of primary oil crops is even almost insignificant. The exports are mainly sesame seeds. During the presented period, the share of processed seeds increased from 60% in 2000 to 71% in 2011, the direct food consumption decreased from 25% to 19% of the total domestic supply. In conclusion, the quantity and share of processed oilseeds in Myanmar increased.

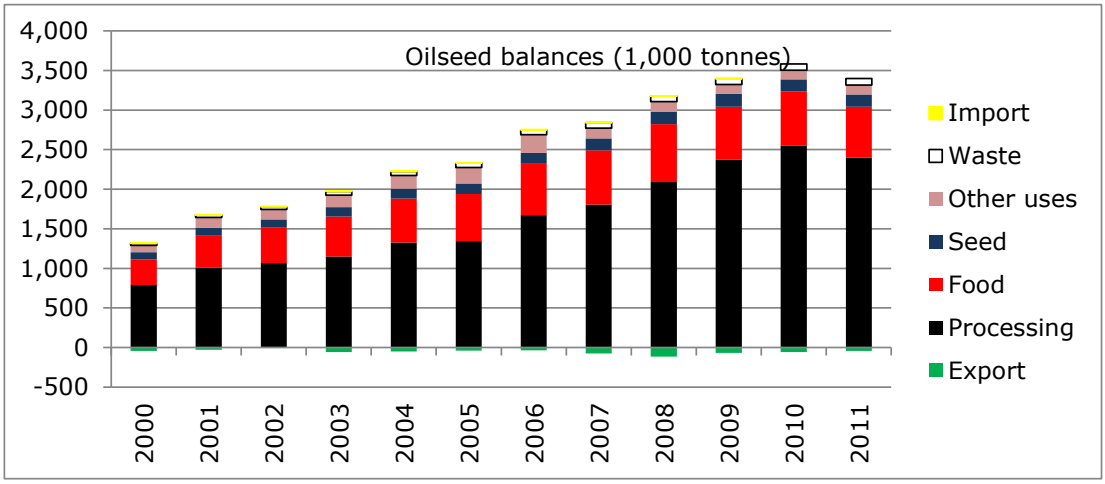


Figure 2.3 *Oilseed utilisationa in 1,000 tonnes in Myanmar.*
[a] Export is expressed as a negative number (not domestically available), but is positive value in export.
Source: Based on FAOstat Food Balance Sheet.

2.3 Sesame seeds and oils

2.3.1 Properties of sesame seed and oil

Sesame seeds are used in a wide range of applications (Lin, ca .2007; Mkamilo and Bedigian, 2007).

The most important are:

- Edible oil
  The refined oil is almost odourless and tasteless. In EU and Asia, mainly refined oil is used. Roasted sesame oil resists rancidity due to the antioxidants formed during seed roasting. Sesame oil is especially important in the Far Eastern kitchen, mainly Japan and China. The oil is used as cooking oil or in salad dressings.
  Crude sesame oil varies from dark to pale yellow (refined oil is clear) and has a nutty flavour. It consists of glycerides of oleic acid (36-54%) and linoleic acid (38-49%); other components are the saturated fatty acids such as palmitic acid (8-12%), stearic acid (3.5-7%) and some other fatty acids.
- Sesame oil cake
  The protein content of sesame cake ranges from 35% (expeller-pressed, not hulled) to 47% (hexane-extracted, decorticated).
- Food ingredients
  Roasted sesame seed in Myanmar as in many other countries are used in snacks, curries or in salads (Lin, ca.2007).
- Confectionary, biscuit, and bakery industry
  Mostly hulled clear white sesame is required for bakery products. Hulled sesame sticks to the bread, while maintaining the white colour after baking. Roasted sesame has a nutty taste.
- Tahini industry
  Tahini, a traditional Middle East paste, is made from hulled sesame seed and is rich in protein.
- Halva industry
  Halva is a sweet made of 50% tahini, boiled sugar or honey and some other ingredients.
- Sesame flour
- Sprouts of sesame seed
- Pharmaceutical ingredients.

In Myanmar three main types of sesame seed exists:(Lin, ca 2007, p93)

- White is roasted and used in snacks and in salads.
- Red is cheaper than white and mainly used for oil extraction.
- Black is mainly exported to Japan and is grown in Aunglan Township and Magway division.

2.3.2 Production and utilisation of seeds and oil

Myanmar became last decade the largest producer of sesame seeds in the world: almost 19% of the world production in 2013, surpassing India and China. Myanmar showed a strong growth in production as the third largest producer in 2003. Other strong growers are African countries, especially Tanzania. The world production grew from 3.2m tonnes in 2003 to 4.8m tonnes in 2013: a growth of 48%. The production in Myanmar outperformed this growth: a growth of 78%. Nevertheless, almost all African countries showed a stronger growth in that decade. India and Ethiopia reached their production peaks in 2010 and their production declined after that year. The African continent produced 45% of the world sesame seeds in 2013 (in 2003 28%). As a result, Asian share declined from 68% in 2003 to 52% in 2013, despite the strong growth in Myanmar.
Sesame yield in Myanmar is above world average and the levels of India (ranked 2 as producer) and Sudan (rank 4 as producer). The yield is less than half of the level of China and below the level of Tanzania and Ethiopia. This indicates some possibilities of increasing the yields.

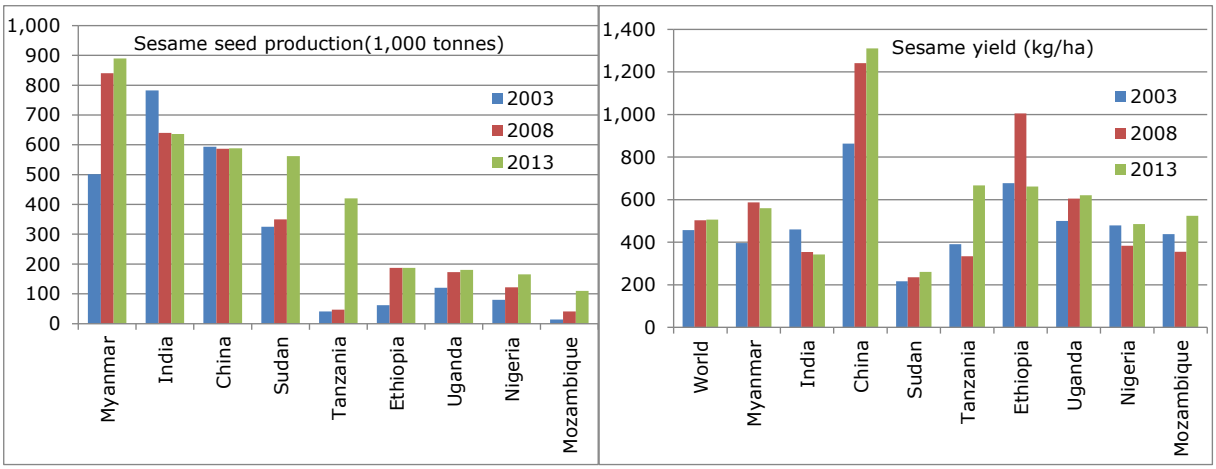


Figure 2.4 *Sesame seed production and yields in the main producing countries.*
Source: Based on FAOstat.

In Myanmar 80 to 90% of the sesame-seed is processed in other products mainly vegetal oil. The exports share is on average 7% of the total seed production: peaking at 13% in 2008. The export volume does not follow the production, despite the rather strong production growth. The direct consumption as food is rather stable at 10% and the last 6 years 1% is used as sowing seed. The consumption of sesame oil did not change much. In the period 2001 to 2011, the average consumption of seeds was on average 1.2 kg/capita /year and for sesame oil 1.6. Remarkable is the high use of sesame oil for other purposes; during the fact-mission we found this is mainly used in restaurants or the food industry. Hence, the direct and indirect consumption of sesame oil almost doubled. Furthermore, the FAO statistics did not provide data on waste or feed purposes of seeds or oils. Annex 2.2 provides detailed information on sesame seeds and oil utilisation in Myanmar.

2.3.3 Export

Sesame seeds

One would expect that if a country has a growing production it will have also a growing export. For some countries such as the African countries, this expectation is indeed the reality. Tanzanian exports increased less than the production, due to a high level of domestic processing according to the FAO statistics. However, India shows a growing export and a declining production. Myanmar shows a growing production but a low export (less than 2% of the production), which fluctuates. Myanmar exports mainly to China - high levels in 2007 to 2010- and to Japan: from 2010 annually each country around 10,000 tonnes. These two countries account for 80 to 90% of the export destination of Myanmar. Myanmar share in world exports is below 2%, despite its rank as the number 1 producer. Figure 2.5 presents the export quantities and prices of the leading exporters. The 4 leading exporters have a combined volume above 150,000 tonnes/year. The total exports in 2010 to 2012 were about 1,4m tonnes of seeds. This is just below 30% of the world production. India and Ethiopia have a significant share of 20 to 23%. The top-5 exporters have a total share of almost 75% of the total world export volume. Myanmar export prices are below world average and those of India, but above the level of Ethiopia and Nigeria. Moreover, the prices in Myanmar are catching up to the world market level. One should take into account that price differences are the results of differences in quality (composition, taste, colour, size) or in provided quality assurance. Pricewise, African countries are competitive.

Remarkable is the export by the EU-28, the production is negligible, but the export is above 2% of world's total; the Netherlands takes the major share (around 50%). This can be explained by the fact that these exports are re-exports, maybe after some processing such as grading or hulling. Furthermore, the exports of the EU-28 include exports to other EU member states. The Netherlands has some comparative advantages in trade of commodities to other EU countries: such as the seaport Rotterdam and an excellent logistic infrastructure. To a lesser extent, value adding applies also to China: it is a net importer.

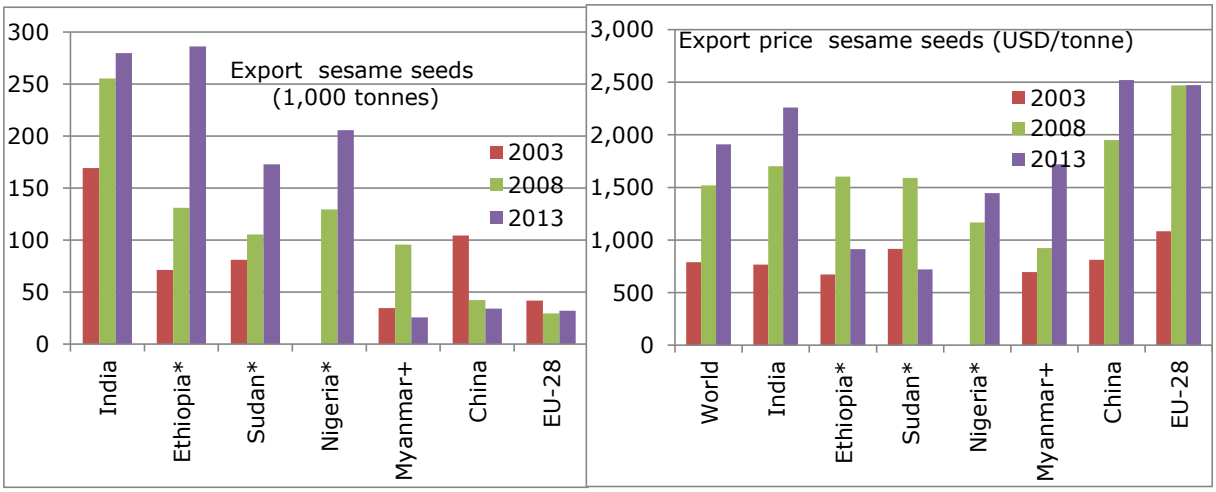


Figure 2.5 *Exports of sesame seeds and price of important countries*
Source: Calculations based on UNComtrade.
** Average 2010-2012, due to missing data in 2013*
+ Due to insufficient data: Myanmar's export is the total of imports by other countries.

Sesame oil
Worldwide, the total export of sesame oil is around 45,000 tonnes in the most recent years: small compared to the export volume of seeds. Some large sesame seed producers -Tanzania, India and China- are amongst the top-10 exporters of sesame oil. Myanmar is not exporting sesame oil. However, some producers with very low production volumes are in the top-10 list. Japan, Lebanon, USA and the EU-28 have all a production below 1% of the world production. Japan is the third and the EU-28 the fifth largest exporter, both countries achieved rather high export prices. These export levels can only be achieved by substantial imports of seeds. As Myanmar is not exporting sesame oil, we will not further elaborate on this. We conclude that export of sesame oil is a value-adding opportunity for Myanmar

2.3.4 Import

Sesame seeds
The top-4 importers of sesame seeds are China, Japan, Turkey and the EU-28; together these 4 countries/regions import over 60% of the total. China - the largest importer -ranks third position as producer and also is in the top-10 of exporters for both seeds and oil. The top-5 importers have a share of two-thirds of the total imports. We showed earlier that EU-28 and Japan, with low domestic production, are the second and third importer of sesame seeds as well as in the top-5 exporters of sesame oil. They get the highest export price for sesame oil; the EU-28 also gets a high price for seed export prices. This indicates a strong processing industry that focusses on value added.
Of the large importers, the EU-28 and the USA pay consistently relatively high import prices during the whole period. China, India, Thailand (neighbouring ASEAN country) and Turkey pay below the average world market prices. Relatively high prices are paid by Japan which is an important export destination of Myanmar. This indicates that some markets might be profitable for Myanmar. However, differences in quality issues might explain differences in price.

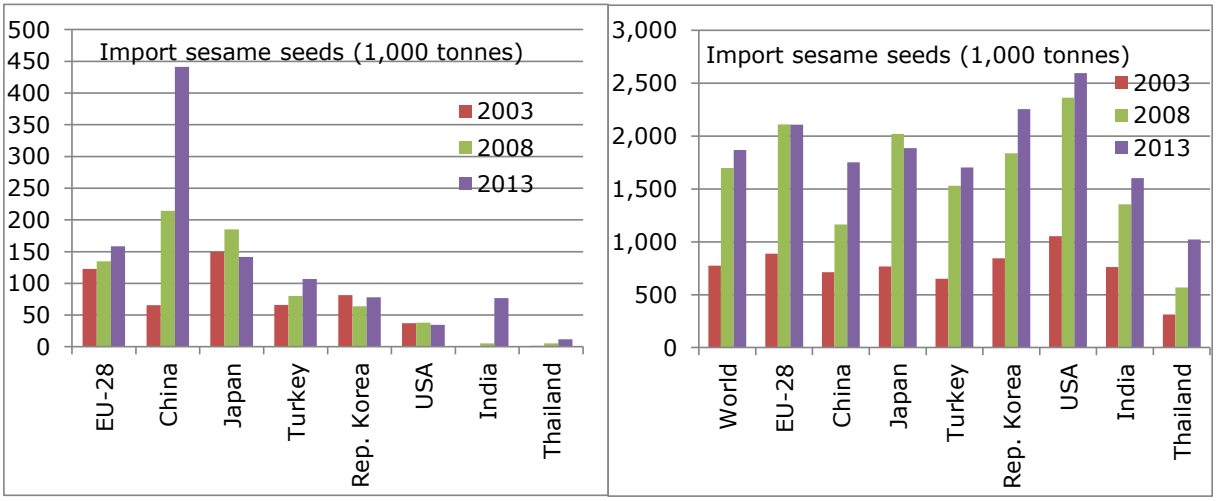


Figure 2.6 *Main importing countries of sesame seeds: quantity and prices.*
Source: Calculations based on UNcomtrade.

Sesame oil

The presented importers of sesame oil have a share of around 60% in 2011-2013. The USA (share 25%) and the EU-28 (share 19%) have a significant and growing share in these imports, other countries make up around 4%. Neighbouring Thailand has an insignificant share of 0.2%. The high-income countries pay relatively higher prices. The import quantities of oil are low compared to volume of seed imports. Most neighbouring countries have import prices below world market level.
The price of oil (2013 world average USD4,070 per tonne) is 2.2 times the level of seeds (2013 world average USD1,868 per tonne). This price difference reflects the costs of processing, the benefits of the value of the oilcake and the entrepreneurs profit. Oil producing is an opportunity for Myanmar.

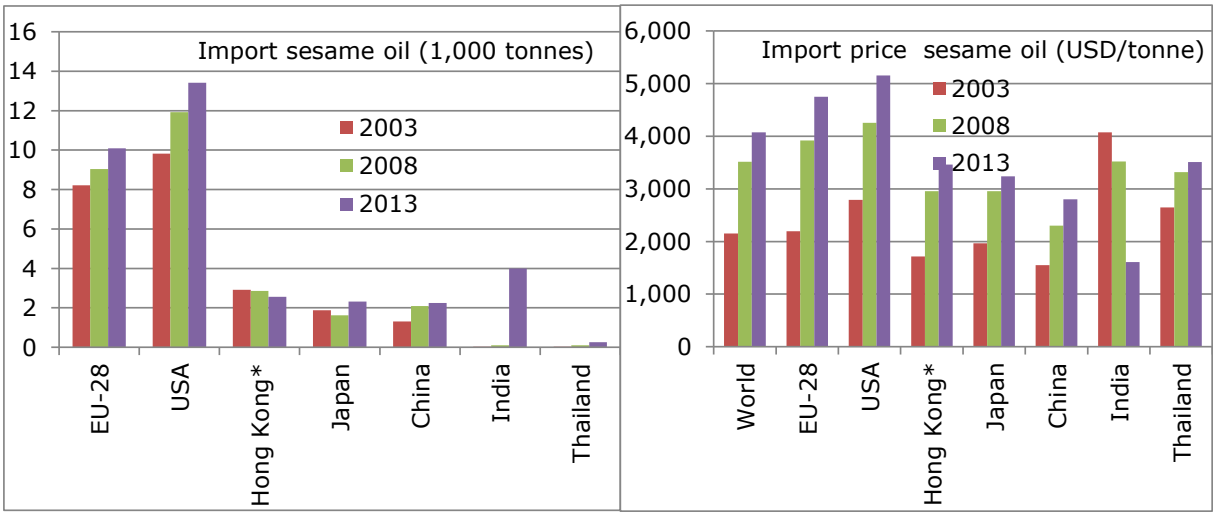


Figure 2.7 *Top importing countries of sesame oil.*
** Hong Kong 2013 data are lacking; value of 2012 is taken.*
Source: Calculations based on UNcomtrade.

2.4 Groundnuts

2.4.1 Properties of groundnuts and oil

Groundnuts, indicated by its scientific name 'Arachis hypogaea L.', is mainly used for food and oil extraction (Ntare, 2007). Many varieties of groundnuts are grown throughout the world. Being a

leguminoseae it contributes also to the N-fertility of soils (Lusas, 1979). The oil content of groundnuts seeds (without pods) is 42-56%.The oil contains 36-72% oleic acid, 13-48% linoleic acid and 6-20% palmitic acid. The ratio of oleic to linoleic acid varies from less than 1 to more than 3. Oil millers consider a ratio above 1.3 as satisfactory, higher ratio's results in more stable oil and hence a longer shelf life.

Groundnuts have some advantages over other major oilseeds. With simple roasting and grinding processes, it can be used in many food forms. Furthermore the oils are pleasantly flavoured, and do not require severe refining (Lusas, 1979). A main disadvantage is that some people are allergic for groundnuts. The main uses of groundnuts are:

- Edible oil
  Crude groundnut oil is used for cooking in developing countries. It has a slightly sweet, green, and nutty flavour. It deteriorates slowly and may contain aflatoxins that can be inactivated. The oil is not well suited for margarines, due the possible allergic reactions of people.
- Boiled fresh groundnuts.
  Unshelled immature groundnuts are eaten in some regions as a delicacy. Commercially, canned or frozen groundnuts are sold.
- Roasted groundnuts in the shell and/or shelled.
  Groundnuts can be roasted in dry heat or frying oil and some salt is added and eaten as snacks.
- Confectionary and cookies industry.
  Groundnuts are used in candy bars, e.g. mixed with chocolate or in cookies. The variety of candies containing groundnuts is large.
- Peanut butter
  Peanut butter is used as sandwich spread and as an ingredient for bakery and candy products. Peanut butter is semi-perishable and widely available in grocery stores. To improve smoothness and to prevent separation of oil stabilisers are usually added.
- Groundnut oil cake.
  The oil cake after oil extraction is a rich in protein used as human food or as feed. The cake contains 40-50% easily digestible protein, 20-25% carbohydrate and 5-15% residual oil (Ntare, 2007).
- Food ingredients
  Groundnuts are used for thickening soups or they are made into sauces to be eaten with meat and rice.
- Groundnut proteins concentrate and flours
  These concentrates have high levels of protein and are used in, among others in breads and in curd and cheese type derivatives(Lusas, 1979).

Contamination with aflatoxins can be a major disadvantage of groundnuts. High intakes of groundnut products with aflatoxins contamination by Aspergillus fungi might result in liver cancer. Refined oil is free of aflatoxins; aflatoxins remain after advanced industrial processing in the cake. In addition groundnuts are one of the most allergenic foods known and may cause anaphylactic reactions (Ntare, 2007).

2.4.2 Production and utilisation of seeds and oils

Myanmar increased its production of groundnuts at a rather constant pace since 2003, becoming the sixth largest producer in the world. The production increased from 0.9m tonnes in 2003 to 1.4m tonnes in 2003. It outpaced the growth of the total world production of 45.3m tonnes in 2013. Myanmar's share in the world increased from 2.4% in 2003 to 3.0% in 2013. The leading producers are China, which produced 17m tonnes or 37% of the world total in 2013 and India (producing 9.5mn tonnes and a share of 21%). In contrast to Myanmar, the production fluctuated strongly in India, Nigeria, USA and Sudan (before 2012 former Sudan). Asia accounts for around two-thirds of the groundnuts production, Africa for one-quarter and the Americas for the remaining 8%. These shares were more or less stable in the last decade.
Besides the increasing production, also the yields per ha increased: 1,340 kg/ha in 2003 to 1,545 kg/ha in 2013. Nevertheless, the yields in Myanmar are 10 to 20% below world average, 50 to 60% below the level of China and two-thirds below the level of the USA. Increasing yields seems achievable and therefore constitutes a real opportunity.

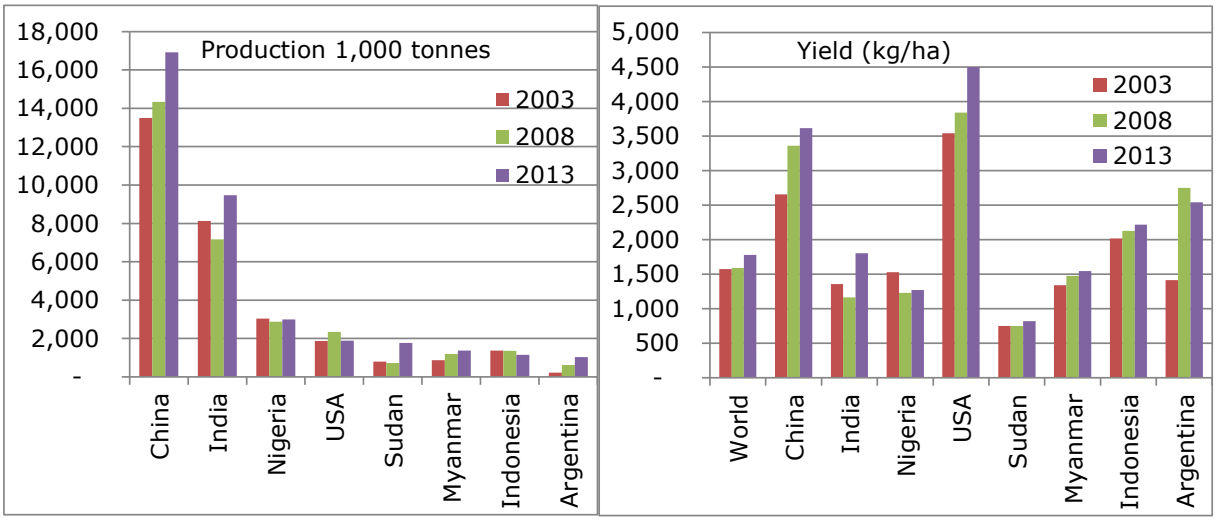


Figure 2.8 Leading countries in groundnut production and their yields.
Source: Based on FAOstat.

Myanmar used 12 to 13% of groundnut production for direct food consumption and another 10 to 12% as seed. Imports and exports of groundnuts are very small and negligible (below 0.3% of total production) and for oil even smaller. A major part of the groundnuts (40 to 60%) is processed and the groundnut oil is fully used for food. The edible oil yield is around 30% of 1 tonnes of groundnuts in shell. This supply of groundnut oil for domestic consumption is the third in volume after imported palm oil and domestic sesame oil (see Section 2.2). Waste of groundnuts is around 5%, reducing this level might be an option to improve the income in the supply chain. The remaining oil cake is used as animal feed; just 1% is exported and no imports are indicated by the FAO. Detailed information is in Annex 2.3.

2.4.3 Imports of groundnuts and groundnuts products

In the trade statistics of UNcomtrade, three categories of trade in groundnut are distinguished:

1. Largest in volume are 'ground-nuts, not roasted or otherwise cooked, whether or not shelled or broken (product code H0H1H2H3H4). In 2013, the volume was 1,570,000 tonnes. The world export price in 2013 was on average USD1,370 per tonne, the lowest price per tonne of the three categories.
2. 'Ground-nuts, prepared/preserved, whether/not containing added/sugar/other sweetening matter/spirit, n.e.s (product code H0H1H2H3H4)' is second in quantity: 930,000 tonnes in 2013. The average world export price in 2013 was USD2,320 per tonne and hence highest in value per tonnes.
3. With 150,000 tonnes, 'Ground-nut oil and its fractions, whether or not refined, but not chemically modified Product code H0H1H2H3H4' is the third group. The average world export price in 2013 is almost USD1,900 per tonne and hence second in rank.

We will briefly discuss these three groups. As Myanmar is almost inactive on the world market, the presentation aims at providing information on possible market windows based on imports.

Import of unprocessed groundnuts

The imported volume of groundnuts grew from 1.4m tonnes in 2001 to 1.85m tonnes in 2013. The main importer of groundnuts in shell is the EU-28: 70% of the total world import volume went to the EU-28 in 2013. As shown above, a significant part of these imports is re-exported to third countries or to other EU-member states. Leading in the EU-28 import is the Netherlands (29% of world total in 2013), followed by Germany (10%) and the UK (8%). Indonesia is the second largest importer after the EU-28 with a share of 24% (280,000 tonnes) and the other 3 countries in the top-5 import around 8% of total world imports (or about 100,000 tonnes). The imports are rather stable during the presented decade, only Indonesia showed a growth.

The EU-28 import prices are above the average world market price. As is depicted in Figure 2.9, the prices are converging: in the latter years, the Indonesian prices are nearer to the world average and Russian prices are even above world average. The neighbouring countries China and India are small importers and therefore not included in the graphs.

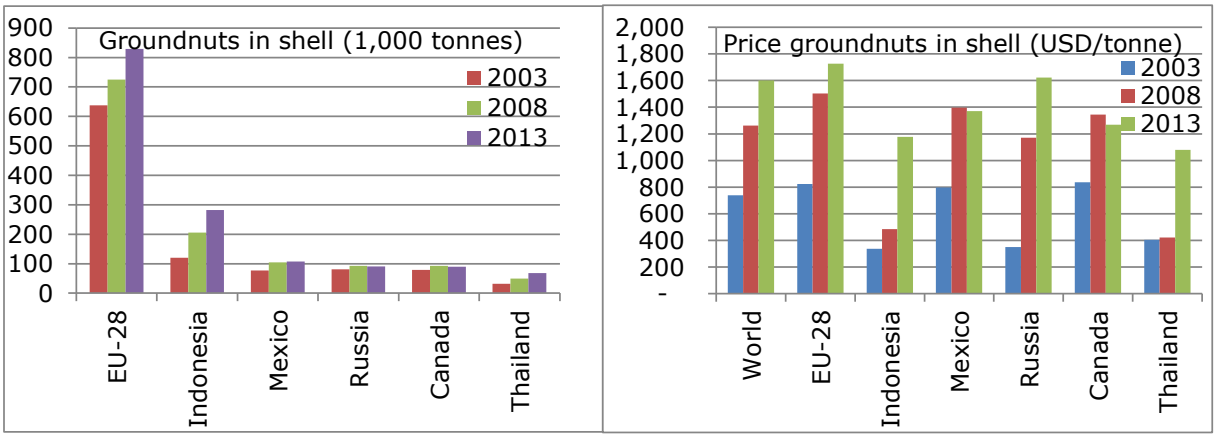


Figure 2.9 *Import of unprocessed groundnuts and prices.*
Source: Based on UNcomtrade.

Import of processed groundnuts

The world import of processed groundnuts grew smoothly from 286,000 tonnes in 2001 to 493,000 tonnes in 2013. The EU-28 is also the most important player on the import market of processed groundnuts: it has a market share between 33 and 45%. Main EU importers are France (with a decreasing share from around 30% in 2001 to 2003 to 22% of the total EU-28 imports in 2013), UK (with a growing share from 2 to 17%) and Germany (stable around 13 to 14%). Canada increased its imports during the period 2001 to 2013. The volume of the other countries remained rather stable: their share decreased due to the growing total world imports. Countries with relatively high incomes are the main importers: the neighbouring countries have an import share below 1%.
The EU-28 import price is above average, Japan and the Republic of Korea have import prices below average.

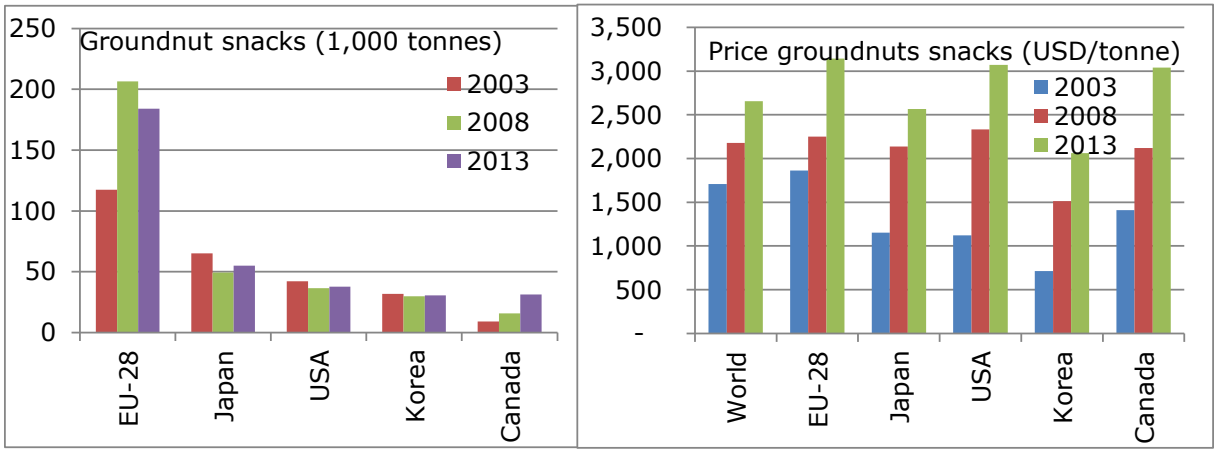


Figure 2.10 *Import of processed groundnuts and prices.*
Source: Based on UNcomtrade.

Import of groundnut oil

The world imports of groundnut oils declined from 263,000 tonnes in 2001 to 190,000 in 2013. The EU-28 contributed strongly to this decline: 160,000 to 180,000 tonnes in 2001to 2003 and 90,000

tonnes in 2012 and 2013. The EU share in total world imports decreased from two-third to below 50%. Italy (38% in the EU-28 imports in 2013), France and Belgium (both a share of 21% in the EU in 2013) were the main EU importers. China is the second importer (with a market share of one-third) and the USA (5 to 10%) is the third importer. These three have a combined market share of 80 to 90%. The neighbouring countries -India and Thailand- have very low levels of imports (below 50 tonnes annually) and are not included in the graphs. The EU-28 import price is around the average world-import-price, the USA below and the Chinese price shows a strong fluctuation. Allergy issues might be the reason for lower imports in the EU.

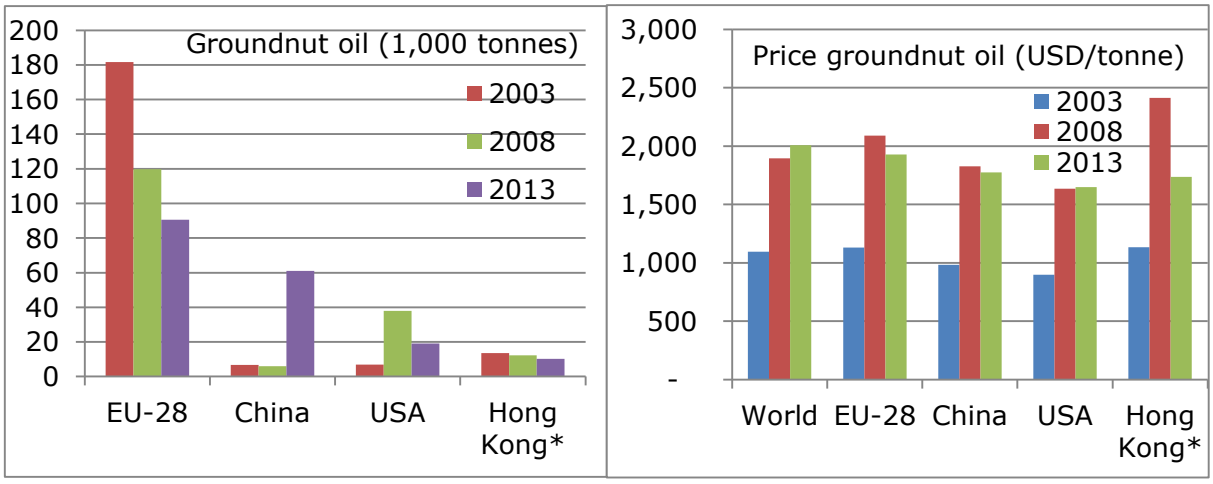


Figure 2.11 *Import of groundnuts oil and prices*
** average of 2011 and 2012, due to lacking data in 2013.*
Source: Based on UNcomtrade.

2.5 Mustard seeds

2.5.1 Properties of mustard seeds and oil

Myanmar Mustard seed is indicated with the scientific name 'Brassica juncea' and is also called Indian mustard, Chinese mustard, or leaf mustard. Brassica juncea is a different variety than grown in e.g. Ethiopia where 'Brassica carinata' is grown. The oil content of the seed is 28-45% with an average of around 35%: the oil is similar to that of other *Brassica* species. The main oil components are: erucic acid 25-55%, oleic acid 8-33%, linoleic acid 12-21%, linolenic acid, 8-14%, eicosenoic acid 6-12% and palmitic acid 2-4% (Schippers and Mnzava, 2007).
Seeds are used for:

1. The production of brown mustard, which is spicier than the yellow type made of brassica nigra. In Europe, Brassica juncea has replaced Brassica nigra.
2. Extracting oil. In India and the surrounding regions, mustard oil is a major oil and appreciated for its special and spicier taste. The high level of erucic acid restricts the use in Western countries.
3. Seeds of cultivars with high erucic acid content are used for industrial purposes such as surfactants (lowers the surface tension e.g. of plastic bags), as lubricants or as biodegradable biodiesel.

The remaining oil cake meal is high in protein (around 37%), but the high glucosinolate content makes it unacceptable for human or for single chambered stomach animals (such as pigs, horses). Ruminants (cows, sheep or goats) can digest the cake.

- In addition to the use of seeds, Brassica juncea has several other uses:
  - Leaves are shredded, cooked and served as a side dish or in soups.
  - Young tender leaves, called 'mustard greens' are used in salads.
  - Leaves are used in pickles
  - Sprouted seeds are used as a garnish or in salads.

2.5.2 Production and utilisation

Worldwide mustard seeds are one of the oilseed specialties: less than 0.1% of the volume of all oil crops and around 1% of the volume of rapeseed. Soya beans and oil palm fruits are the major oilseeds, each accounting for at least one quarter of the total world production. Myanmar ranks number 3 in the world largest mustard seeds producers: with a share of around 15%. Furthermore, the production is growing continuously since 2000. Nevertheless, mustard seeds are the smallest in volume in Myanmar with around 90,000 tonnes in 2013.
Almost all seeds are used for processing. Small volumes are used as sowing seeds or constitute waste. No seeds are used for direct consumption. The quantity oil is 23-25% of the quantity-processed seeds: all oil is used for other purposes, most probably in restaurants and in the food industry.
These presented top producers have a share of 91% in the total world production in the period 2001-2013. The production levels of Canada, Ukraine and Russia show some fluctuations. The peaks in 2004 and 2009 are the result of high production levels in Canada and Ukraine. The yields in Myanmar are around world average and above the level of Russia and Ukraine. Canada and Europa have a level production that is 20% above the world average.

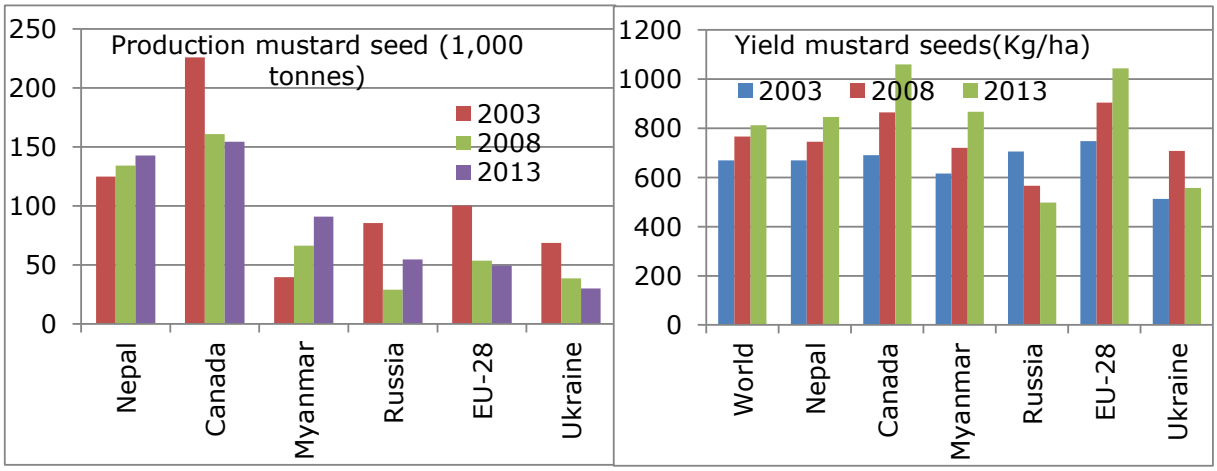


Figure 2.12 *Production and yields of mustard seeds in the main producing areas.*
Source: Based on FAOstat.

2.5.3 Import of mustard seeds

In trade statistics, rape and mustard seed-oils are combined in one category and seeds are in separate categories. For that reason, we discuss only the import of seeds. Myanmar has very low levels of international trade and in addition no stable trade relationships. For that reason, we present only the worldwide import developments.
Two regions are responsible for 60 to 90% of the world imports: the USA and the EU-28. These two are consistently on the market. Until 2007 and in 2011, Nepal had significant imports and Bangladesh had large imports in 2003 and 2011. Germany takes around 40% of the total EU imports last decade, France 20% and the Netherlands 12%. Germany and the Netherlands are the largest EU exporters, which is based on these imports. Japan (important export destination for Myanmar sesame seeds) and Thailand (neighbouring ASEAN country) pay above the average world import prices. Exporting to these countries might be an opportunity for Myanmar.

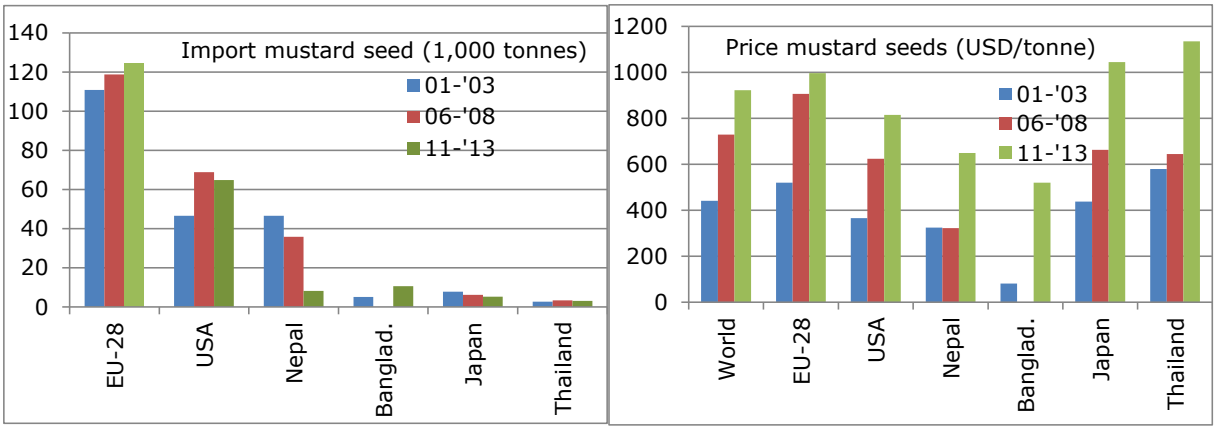


Figure 2.13 *Import of mustard seeds and import prices.*
Source: Based on UNcomtrade.

2.6 Sunflower seeds

2.6.1 Properties of sunflower seeds

According to Salunkhe *et al.* (1992), the chemical application of sunflower oil is comparable to that of groundnut (a well-known product in Myanmar); it contains a similar amount of fats and of essential amino acids, but is richer in polyunsaturated lipids. Two types of sunflower exist: for oil processing or for confectionery. The latter are consumed as whole seed as snack, in confectionary or as groundnut substitutes. These mainly large-sized seeds represent less than 10% of the total sunflower production. The overview of Salunkhe *et al.* (1992) reports oil contents between 32 and 54% depending on the cultivar and author. Sunflowers contain more unsaturated fatty acids than most other oilseeds and is seen a premium vegetable oil (Salunkhe *et al.*, 1992). The oil is used as cooking oil, salad oil or in margarine

Oil extraction can be done by using general equipment and operating conditions used for other oilseeds among other like soya beans. Several stakeholders in Myanmar, however, mentioned the hull as a strong disadvantage for crushing sunflower seeds. As crude sunflower oil contains low levels of free fatty acids (FFA), it needs not to be refined extensively. Crude oil may contain aflatoxins and have strong characteristic flavour and odour. In Europe mainly deodorised sunflower oil is used.
Sunflower is also used in industrial products e.g. in lacquers, polyester or plastic. As semi drying oil, it is less suited for paints.

Commercial defatted sunflower meal is not suited for human consumption because of the high fibre levels and polyphenols. For human consumption, the seeds have to be hulled before oil extraction.

2.6.2 Production and utilisation

The share of Myanmar in the world production (45m tonnes in 2013) of sunflower seed is negligible: less than 1%. The production peaked in 2010 at 780,000 tonnes and declined after those years to a mere 360.000 tonnes in 2013.The neighbouring countries are also relatively small to very small producers. Of these countries, China has rather high yields levels; all other countries in the region including Myanmar have low yields levels. Achieving higher yield levels might be an opportunity. Export is not identified as a major opportunity due to Myanmar's small share in the world production. Other crops have greater opportunities on the world market.

Around 5% of the production of sunflower seeds is used for direct consumption, 2 to 3% for seeds and the remaining is processed into edible oil. Myanmar's international trade in sunflower seeds is almost negligible, only in some years, very small quantities are imported.

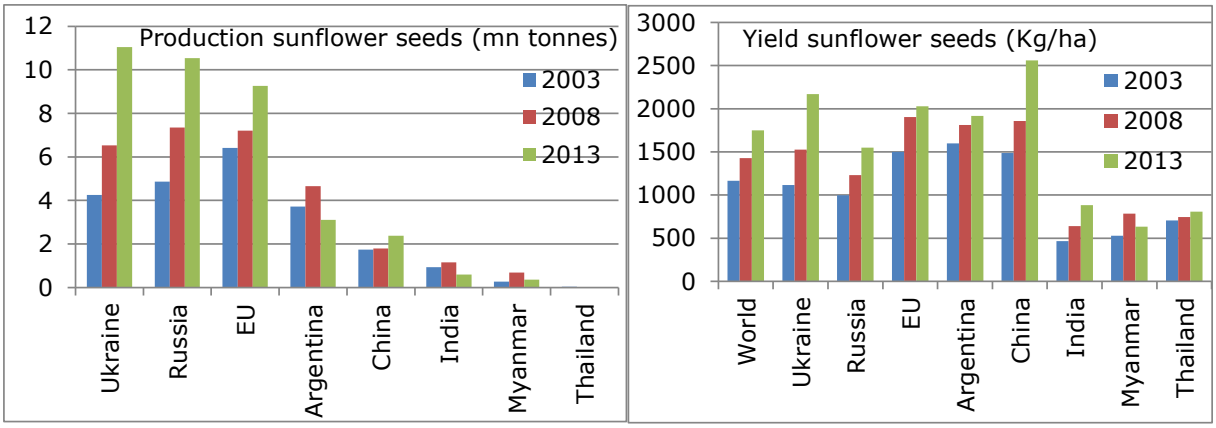


Figure 2.14 *Production and yields of sunflower seeds in the main producing areas.*
Source: Based on FAOstat.

2.7 Soya beans

2.7.1 Properties of soya beans and oil

Off-flavour and off-aroma are limiting factors in using soya beans products. Degradation of polyunsaturated fatty acids (linoleic and linolenic) and the enzyme lipoxygenase are responsible for the off-flavour. The flavour depends on handling and processing. Soya beans have few direct uses for consumption and differ in this respect from many other oilseeds. The seeds have to be processed before human consumption and the major use is meal for animal feed (Weiss, 2000). Crude oils need further processing, due to beany and off-flavours. Almost all soya bean oil is refined and widely used in the food industry.

The protein contents in beans ranges between 14 and 23% and the oil content ranges between 32 and 50%. Proteins and lipids make up around 60% of the soya beans. The contents of both depend on cultivar, agronomic and climatic conditions. Trade-offs exists between yield and protein content and between protein and oil content. Strains with higher protein have lower oil content (Salunkhe *et al.*, 1992) p9-58. The high protein makes the oil cake an excellent raw material for animal feed. This is seen as an opportunity for the poultry sector in Myanmar.

Soya beans are currently the world's most important source of vegetable oil. Soya beans are usually dried to reduce the moisture content to less than 12% and can be stored for 2 years without change in grade. High moisture contents encourage growth of fungus and mould and can results in higher free fatty acid values of the oil. Beans with a 14% or higher moisture content are usually dried before storage (Wolf *et al.*, 1971). Soya beans are processed in oil and flakes. The defatted flakes can be used as meal in animal feed or as protein in food. The defatted soya flours after oil extraction are rich in proteins (above 50% proteins) and contain about 1% fat. This flour can be processed in concentrates (more than 60% proteins) or in isolates (more than 80% proteins) by extracting sugars, ash and other constituents. From these products, textured protein products (meat replacers) can be made, with chewy and fibrous properties. The oil, as many other edible oils, is used as cooking oil, salad oil or dressing, in shortenings (bakery cooking fat) and in margarine.

In the past, soya oil has been used as industrial oil due to the high linolenic acid content and the unpleasant odour when used for frying. Industrial and non-food or feed use, is below 10%. Substitutes are cheaper and used instead of soya oil. Soya oil is semi-drying and are used for paint, varnish, plastics and similar products (Weiss, 2000), p316).

Mature whole soya beans are not easily digested; they contain toxics and off-flavour. Before being edible they must be soaked and cooked for a long time or processed such as roasted, fermented or sprouted (Giller and Dashiell, 2007). Whole soya beans are mainly used in the orient as soya milk, tofu, miso and tempeh. Furthermore, sprouts from soya beans are well known in Asian food.

2.7.2 Production and utilisation

Worldwide 276m tonnes of soya beans were produced in 2013 of which the major parts were produced in North and South America. Myanmar produces only 0.2m tonnes and is not relevant for the world supply of soya-beans. The production in China and India has a volume of over 10m tonnes. Thailand is a non-significant producer. A first and main challenge for Myanmar is increasing the yields that are among the lowest: far below China and the world average.

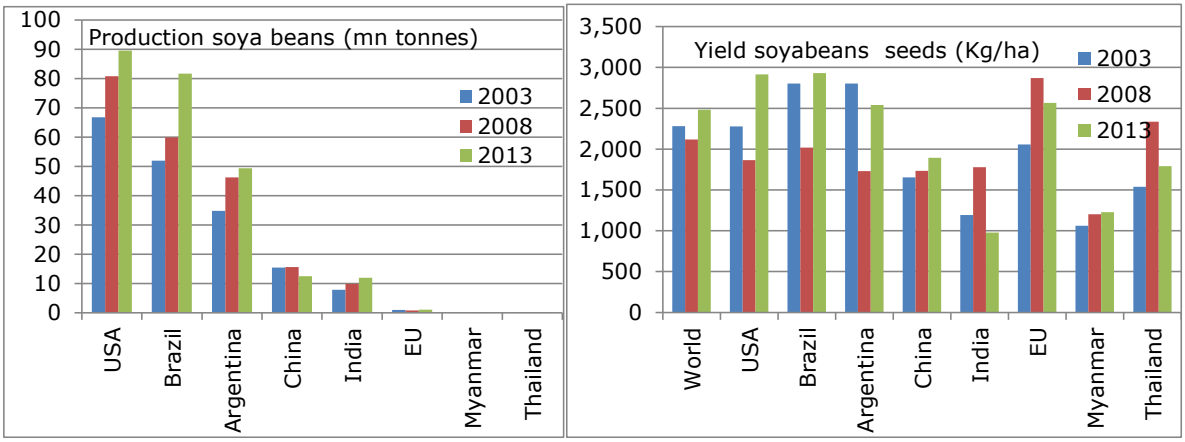


Figure 2.15 *Production and yields of soya beans in the main producing areas.*
Source: Based on FAOstat.

Myanmar exports a small amount (2%) of the produced soya beans, the rest is used as seeds (4%) or are wastes (2%), or direct consumption (10%). The major part is processed into oil, which is domestically used. Production of soya beans might have opportunities outside the edible oil sector: e.g. as protein rich food or as oil cake in animal feed (e.g. for chickens or fish). The oil return will be a valuable by-product but not the main product.

2.8 Cottonseeds

Cotton oil is an important edible oil source in Myanmar: the quantity is larger than oil extracted from soya beans or mustard seed, but less than oil from sunflowers. Cottonseed is a by-product of the production of cotton lint. In the world, Myanmar is a small producer with less than 1% of the world production. Nevertheless, the production increased from around 125,000 tonnes in 2003 to 2008 to 280,000 tonnes in 2013 with a peak of 350,000 tonnes in 2011. Yields cannot be compared due to lacking information in the FAO statistics.

After ginning cottonseeds, the remainder consists of linters (5-10%), oil (15-33%), oilcake (33-45%) and hulls (24-34%). Cottonseed oil is a semi-drying oil. The oil and other plant parts of Gossypium species contain gossypol, which is toxic to humans and animals. The gossypol content of Gossypium hirsutum seeds is generally lower than that of Gossypium barbadense. Gossypium hirsutum counts for 75% of the area of cotton in Myanmar. The other variety Gossypium arboretum is local (Nu, Not dated). Gossypol can be removed from the oil by solvent extraction, following mechanical and/or solvent oil extraction from the seed. The cake meal contains over 40% crude protein, but is not without danger for monogastric animals, because of the gossypol they contain. The gossypol in the cake can be removed or made harmless by chemical (ferrous salts) or physical (heating) means, but

this is more difficult to achieve economically than removing gossypol from the oil. The oil of Gossypium hirsutum has shown antibacterial activity against Gram-positive and Gram-negative bacteria, and the antibacterial activity was not affected by fermentation of the oil (Ikitoo, 2011).Crude oil may contain aflatoxins and has-strong characteristic flavour and odour. Refined oil is an excellent edible oil after inactivation of aflatoxins. The growing demand for cotton is an opportunity for the edible oil sector: the volume of seeds for processing will increase.

2.9 Niger seeds

Little actual information on niger seeds and oils in Myanmar has been found. The report of Favre *et al.* (2009, p43) mentioned that in 2006/2007 63.000 tonnes of niger seeds have been produced. A small quantity is used as seeds (1,000 tonnes), for export (1,200 tonnes) or was waste (3,800 tonnes). The majority is used for processing oil. The production was 19,000 tonnes niger seed oil: even more than the 12,500 ton mustard seed oil in that period (Favre and Myint, 2009). Local taste favours the use of crude and/or semi-refined niger seed oil. '*Niger oil is particularly appreciated in Shan state as frying oil. Niger oil is generally mixed with palm oil. Niger oil is appreciated by consumers not for its taste but because it reduces palm oil evaporation for deep frying*'. (Favre and Myint, 2009).
Unfortunately, in the FAO statistics and the UNcomtrade databases niger seeds are not distinguished. The USA is a major market for niger seeds, used as birdseeds, and buys almost 60% of the world production. Looking at the fatty acid profile the product is rich in linoleic acid (C18:2), with an average of around 75%. Oil content is around 35-45%, while the remaining meal after crushing contains 30% protein and 23% crude fibre. Yields are between 0.7 and 1.2 t/ha. The low yield of oil per hectare and fragmented nature of production does not make this product very attractive as export oil. Crude oil is mainly locally extracted and consumed, has a poor shelf life, becomes quickly rancid, has a slightly nutty taste and a sweet odour (Wijnands *et al.*, 2009).

2.10 Palm oil

Also for palm oil, no information for Myanmar production is available in the FAO statistics. The report of Favre *et al.* (2009) indicated a production of 172,000 tonnes of palm oil fruits in 2006/2007 that are all crushed. This resulted in 24,000 tonnes of palm oil: a higher amount than for niger or mustard seed.
Two types of oil are extracted from the fruits of the palm tree 'Elaeis guineensis' (Ataga and van der Vossen, 2007):

1. Palm oil from the fruit flesh and from the kernel have a volume ratio of approximately 9:1. Palm oil is used for a large variety of edible products, such as cooking oils, margarine, vegetable ghee, shortenings, frying and bakery fats, and for preparing potato crisps, pastry, confectionery, ice cream and creamers. Palm oil is also employed in the steel industry (tin plating and sheet-steel manufacturing) and is a plasticiser and stabiliser in PVC plastics.
2. Palm-kernel oil is similar in composition and properties to coconut oil. It may be used as cooking oil, in margarine, edible fats, filled milk, ice cream and confectioneries. For industrial purposes, it is either an alternative to coconut oil in making high-quality soaps, or a source of short-chain and medium-chain fatty acids. The press cake or palm-kernel meal is a valuable protein-rich livestock feed.

Imported palm oil provides 30% of the domestic supply, as is shown afore. Most stakeholders mentioned palm oil as a major threat for the oilseed production and processing sector: rather cheap oil. However, this is mainly based on the view that only the domestic market is their playing field. We will discuss alternative views below.

2.11 Exploiting the product portfolio of Myanmar oilseeds

The Myanmar oilseed product portfolio is based on sesame seeds and groundnuts. In the previous sections, some indications are already provided which markets are attractive. In Annex 2.3, these data are summarised for all relevant edible oils and the relevant seeds.
First, more processing of products can generate value added on foreign markets:

1. The value of sesame oils on the world market is around USD3,900 per tonne. On the EU market the price is even USD4,500 per tonne and on the USA market USD5,050 per tonne. The value of 1 tonne raw sesame seed is around 1,800USD/tonnes. Hence, this offers some opportunities for processing.
2. Refined groundnuts oil has on the world market a premium price of 17% (USD300 per tonne above crude oil).
3. Prepared groundnuts into snacks have a premium price of 80% (USD1,200 per tonne above groundnuts in shell).
4. Higher quality of seeds has also a premium price, however not available in the trade statistics. The quality is reflected in e.g. the premium price of 20% (USD400 per tonne) that the USA pays on the imported sesame seed whereas Japan pays 10% below the world average price. India and China pays even less. Similar difference can be observed for groundnuts. In general, the EU and USA pays relatively higher prices.

Exploiting such market window might be beneficial for the enterprises in Myanmar.

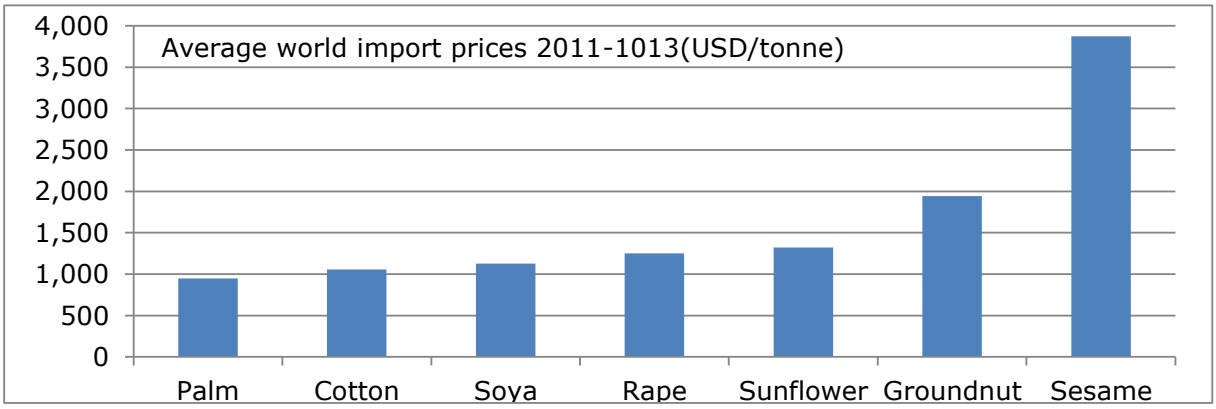


Figure 2.16 *Average prices of (crude) oils.*

Second, the oil specialties can be exploited. For cooking oils, excellent substitutes are available such as palm oil: a major world vegetal oil. To illustrated the possibilities: groundnut is twice and sesame seed even four times as expensive on the world market compared to palm oil. In other words, for each tonne of export of groundnut oil twice and of sesame oil four times the quantity of palm oil can be imported. This increases the domestic supply with edible oil considerable. It can also contribute to foreign currency earnings: substitution of each tonne groundnut oil export by palm oil import results in USD1,000 earnings and for sesame oil even USD3,000. What might be the economic benefit of exploiting substitution of sesame oil with palm oil? In 2012, Myanmar produced 341,000 tonnes of sesame oil (Chapter 2), which has a value at the world market of USD3,900 per tonne or USD1.3bn. The import value of palm oil at world market price is USD0.3bn. The potential contribution to foreign currency earnings of exporting sesame oil and substituting that quantity by palm is hence around USD1bn. This is the same amount as the net trade balance of Myanmar in 2013: 10bn imports and 9bn exports (CIA Fact book).

Trade liberalisation is beneficial for countries welfare, however producers gain more than the consumers (Nyein *et al.*, 2013). A drawback in their study is not including the substitution between groundnut oil and palm oil at the consumer market. The higher price due to export of sesame or groundnut oil does not need to affect the consumer price, if the consumers will use palm oil. However, some conditions have to be fulfilled e.g.:

- Complying with the international standards on quality and food safety.
- Being familiar with the most beneficial markets.
- Sufficient domestic production of groundnuts and/or sesame seeds.

In the chapters below, we will address these issues.

2.12 Summary of properties, production and trade

Sesame
- Worldwide, sesame oil is a minor commodity; the production is less than 1% of the vegetal oil production. Sesame constitutes around 45% of Myanmar's vegetal oil production.
- Myanmar is the largest sesame seed and oil producer in the world. Almost all is consumed domestically.
- Myanmar produces red, white and black sesame seed.
- Seeds have many applications: oil, hulled as bread toppings, snacks, and tahini.
- Crude oil has a special flavour and is valued as cooking oil and for dressings.
- The yields in Myanmar are 10% above world average but only 43% of the level of China and 84-90% of Ethiopia, Uganda and Tanzania.
- Myanmar exports less than 2% of the production mainly to China and Japan (demanding a high quality standard). Myanmar exports at a price below world average.
- USA, EU and Japan pay consistently above world average prices for imported seeds.
- The average import price of oil is 2.2 higher than the import price of seeds.

Ground-nut
- Worldwide, groundnut oil is a minor commodity; the production is around 3% of the vegetal oil production. Groundnuts are around 30% of Myanmar's vegetal oil production.
- Myanmar is the sixth world producer of groundnuts: its international trade is negligible.
- Seeds have many applications: oil, snack, food ingredient, peanut butter.
- Health risks are aflatoxins and some people are allergic for groundnuts. For that reason, groundnut oil is not suited for margarine production in the EU.
- Crude oil has a slightly sweet, green, and nutty flavour and deteriorates slowly.
- The yields in Myanmar are 10 to 20% below world average, 50 to 60% China's level and one third of the level in the USA.
- The EU is the main importer of groundnuts in shell (70% of the world trade) and processed groundnuts (around 40%) paying above average prices. The EU has a share of about 50% in oil imports and pays averages prices.
- Processed groundnuts in shell have a premium price of 80% above those of raw groundnuts.
- India and China are small importers of groundnuts. Chinese import of oil increased last decade with a market share of one third in 2013.

Mustard
- Worldwide, rapeseed oil is the third largest oilseed commodity; the production is 24m tonnes or 15% of the vegetal oil production. Rape is around 1% of Myanmar's vegetal oil production.
- Mustards seeds are a specialty of rapeseeds: 0.1% of the world rapeseeds are mustard seeds.
- Myanmar ranks number 3 in the world production. The yields are on world average level. International trade of mustard is of no importance.
- Seeds are used for oil and for spicy mustard. Seeds with high levels of erucic acid are used in industrial applications (e.g. surfactants).
- Crude oil is spicy.
- The EU and USA are the main importers.

Sunflower
- Worldwide, sunflower oil is the fourth largest commodity; the production is 15m tonnes or 9% of the vegetal oil production. Sunflower oil is about 16% of Myanmar's vegetal oil production.
- Myanmar is a very small producer of sunflower seeds in the world (less than 1%).

- The yields levels in Myanmar are far below world average. Two type of seeds exist: for oil and snacks
- Application of sunflower oil is comparable to that of groundnut oil, but the composition and tastes are different.
- The oil is used as cooking oil, salad oil or in margarine.

Soya beans

- Worldwide, soya oil is the second largest commodity; the production is 42m tonnes or one-quarter of the vegetal oil production. Four percent of Myanmar's vegetal oil is from soya.
- The Myanmar soya beans production (0.2m tonnes) is insignificant in the world production (276m tonnes).
- Soya beans need to be processed before human consumption. Crude oils need further processing, due to beany and off-flavours.
- The high protein makes the oil cake an excellent raw material for animal feed.

Cotton seed

- Worldwide, the production of cotton oil is around 3% of the vegetal oil production. Cotton oil is about 5% of Myanmar's vegetal oil production.
- The Myanmar cottonseed production is around 1% of world's total.
- Cottonseed is a by-product of the production of cotton lint.

Niger seed

- Myanmar produces niger seeds, although actual information is lacking. The production of niger seed oil was 19,000 tonnes in 2006/2007, which was more than the 12,500 ton mustard seed oil in that period.
- Crude oil is mainly locally extracted and consumed (Shan region), has a poor shelf life, becomes quickly rancid, has a slightly nutty taste and a sweet odour.
- Seeds are used and demanded in the USA and EU as birdseeds.

Palm oil

- Worldwide, palm oil is the most important commodity; the production is 53m tonnes or one-third of the vegetal oil production. In Myanmar, the production is not significant.
- Imported palm oil provides 30% of the domestic supply. In 2006/2007, around 24,000 tonnes were produced. Actual information on palm oil production is not retrieved.
- Palm oil is used for a large variety of edible products, such as cooking oils, margarine, vegetable ghee, shortenings, frying and bakery fats, for preparing pastry, confectionery, ice cream and creamers.

3 Oilseeds chain in Myanmar

3.1 The value chain

In this chapter, the actors in the value chain will be discussed. A concise overview of the value chain is presented below. As analysis of the value chain is not the core of the study. We will focus on some key players: sowing seed suppliers, farmers, collectors, processors and export trades. We have included sowing seeds as part of the input suppliers and because seeds are one of the key factors for sufficient supply of raw materials either for processing or for exporting. Furthermore, we will not discuss importers of edible oil (mainly palm oil). However, palm oil will be taken into account in the SWOT analyses, as it supplies one third of the Myanmar edible oil market. Myanmar exports formally only small quantities of seeds and almost no edible oil, therefore edible oil exporters are not within our scope. Eventually, oil cake - a valued by-product - is also out the scope of this study. We are aware that oil cake is a valuable and important raw material for producing animal feeds. Furthermore, some processing possibilities, such roasting, hulling, tahine production, are not discussed. These activities are value adding and might be of interest for the oilseed sector.

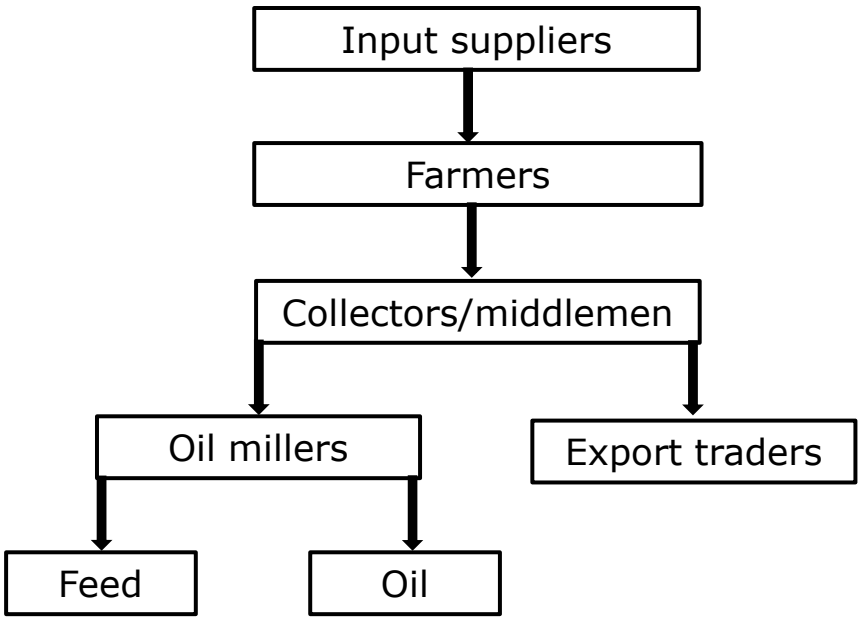


Figure 3.1 *Oilseed value chain.*

3.2 Quality seeds

Several stakeholders stressed that good seeds are of major importance for the development and performance of the oilseed sector. However, seed production and distribution are not well established. Since 1987, seed production and distribution programmes have been developed. Also, Shwe (2011, p63) concluded that 'limitation of the government spending on seed programme has constrained the expansion of the certified seeds programme'. The FAO signed a letter of agreement in 2010 with the Department of Agriculture for the establishment of a revolving fund to be used as working capital for seed production by farmers(FAO, 2013b). According to the FAO, 'the challenges towards establishing a vibrant seeds industry are many' (FAO, 2013a). Weaknesses are lack of critical mass of the private sector, the research system does not ensure an adequate flow of improved varieties, low and volatile producers prices inhibits demand for quality seeds and governance issues of recently enacted seed law.

The importance of quality seeds in combination with best agriculture practice can be demonstrated by comparing the yields of Myanmar with the performance in other countries. For groundnuts, Myanmar has an average yield below world average and over 30% of the countries with at least 1,000 tonnes production have higher yields. The 10% best performing countries have a yield of 2.6 the level of Myanmar. Myanmar yields for sesame seed are just above world average; 70% of the countries with at least 1,000 tonnes production have higher yields. Again, the 10% best performers have yields of 2.6 times the level of Myanmar. These yield levels indicate opportunities for Myanmar to increase the production. Lin provides information on the improved sesame cultivars: he mentions yields levels of 15 to 20 baskets/acre (900 to 1.200 kg/ha) available at Magway Central Research Farm (Lin, ca 2007). This information indicates that higher yields are within reach, although not implemented.

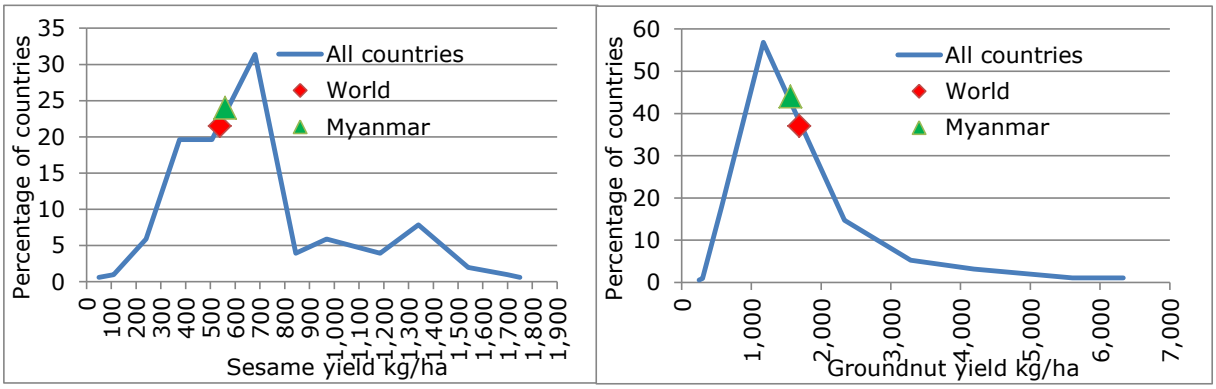


Figure 3.2 *Yield (kg/ha) distribution of countries* in the period 2011-2013.*
Source: Based on FAOstat.
**Selected countries produce above 1,000 tonnes in 2013. Outliers - countries with a yield above 4 times world average - are omitted.*

3.3 Farmers

Production areas
The main production areas of oilseeds are depicted below; areas for all regions are presented in Annex 3.1. Three regions grow almost 90% of all oilseed crops, 85% of the groundnuts and 96% of the sesame seeds. These regions are located in the middle of the country, from the north to almost the south of the country. Other relevant regions are Kachin, located in the southeast, which grows 68% of the mustard seeds; Ayeyarwady, in the southwest, grows the largest area of sunflower seeds (39%) and Shan North and South, which each grow around 22% of other oilseeds. The production plots are small: between 2.3 and 3.7 acres (or 0.9 to 1.5 ha).

Table 3.1
Area of oilseeds in 2010 in 1,000 acres.

State/Region	Groundnut	Sunflower	Mustard	Sesame	Other		Total
						1,000 Acre	%
Magway	478	57	0	1,645	3	2,183	34.5
Sagaing	705	164	15	1,067	37	1,987	31.4
Mandalay	368	64	1	969	3	1,405	22.2
Other	272	225	56	156	46	756	11.9
Myanmar	1,823	511	72	3,837	88	6,332	100.0

Source:(MoAI, 2013)

Yields and production season
Information on the structure of the Myanmar primary agricultural sector is poorly available. Hence, it became not clear whether the areas are based on one or several seasons in one year. Favre et al

(2007) presents crop budgets of sesame seeds for 3 seasons: pre-monsoon, monsoon and cool season. The yield per acre is the highest in the pre-monsoon season 18 baskets (440 kg/acre or 1,090 kg/ha) and 5 to 7 baskets (120 to 170 kg/acre or 300 to 425 kg/ha) in the other seasons. For groundnuts two seasons -monsoon and cool season are mentioned with almost the same levels of yields: 35 to 38 baskets groundnuts in shell/acre or 860 to 930 kg/acre (or 2,100 to 2,300 kg/ha). These yield levels differ considerable from the FAO-statistics - mentioned above - in 2013 560 kg/ha sesame seed and 1,545 kg/ha for groundnuts in shell. More recently, Agrifood Consulting International published data among others from the Sangaing region. For sesame they indicated around 80 kg/acre (200 kg/ha) for the early and late season and for groundnuts between 240 kg/acre (600 kg/ha) in early season and 280 kg/acre (700 kg/ha) for the late season (ACI, 2014). The differences with the formal FAO statistics are still considerable, but now on the low side. These differences might be explained as follows, that the FAO yields are the sum of two growing seasons in one year.

Myanmar can have several crops on the same plot during one year. In the Table below, some information for oilseeds for different seasons are specified. This information will increase the confusion on yields even more. The total area is in the range of those based on FAO statistics, mentioned above. The total production however is significantly lower than that the FAO statistics. Important is that, crops can be growing in one year on the same area of land, but it became not clear how the yields are calculated. The yields of sesame are in the range of ACI (2014), but for groundnuts, the yields are even lower.

Table 3.2

Area, production and yields of oilseeds in different seasons in 2013-2014.

Period	Indicator	Groundnut	Sesame	Sunflower	Mustard	Niger
Monsoon	1,000 ha	446	1,171	92		
	Production (1,000 tonnes)	139	200	20		
	Yield Kg/ha	313	171	222		
Winter	1,000 ha	485	368	389	61	155
	Production (1,000 tonnes)	201	104	100	15	34
	Yield Kg/ha	415	282	256	239	219
Summer	1,000 ha		82			
	Production (1,000 tonnes)		30			
	Yield Kg/ha		370			
Total	1,000 ha	931	1,622	481	61	155
	Production (1,000 tonnes)	341	335	120	15	34
	Yield Kg/ha	366	206	250	239	219

Source: Personal communication with First Top, Primary source unknown.

Yields and gross margins

On farm level, oilseeds compete with other crops for production factors, i.e. land and labour. Crops with higher returns will have an advantage above other crops. Returns are presented for the major crops in Myanmar: information on beans and peas are not available (ACI, 2014). These crops might compete in the crop rotation with groundnuts: both are leguminous.

Maize has the highest gross margins per acre and early groundnuts per family hour. Sunflower ranks third on both indicators. All oil crops outperform rice and especially rice grown in the important oilseed region Sangaing. Rice cultivation covers 40% of all cropland in Myanmar. Based on these data we can conclude that the main oilseed crops are competitive with the major crop rice: other crops do not threaten production of oilseeds. One should notice that the assumptions and growing conditions (e.g. climate condition, soil fertility, seed variety or agronomic practice) are of major importance for the gross margins. This is illustrated by differences between 'early' and 'late' crops in the Table.

The development in areas of these crops showed in the past 5 years a growth: maize (+30%) groundnuts (+9%) and sesame (+11%) and a decline for rice (-7%) and sunflowers (-35%).Except for sunflowers, these developments are in line with the economic attractiveness: gross margins and family labour return. The development in the cultivated area of sunflowers is not in line with the economic attractiveness on farm level. Stakeholders from the oil processors mentioned that sunflowers are a less attractive raw material due to the hulls. Furthermore the yields/ha of sunflowers

declined (-20%) also in that period. More information is needed to understand the reasons for the declining sunflowers production.

Table 3.3
Gross margins and return to family labour.

Crop	Gross margin	Return to family labour
	USD/acre	USD/hr
Maize	345.61	2.88
Groundnut (early)	203.31	3.36
Groundnut (late)	102.69	1.70
Sesame (early)	122.59	1.49
Sesame (late)	126.00	1.32
Sunflower	172.34	1.86
Rice (overall)	119.72	0.76
Rice (Sangaing)	72.74	0.42

Source: (ACI, 2014).

Constraints for Good Agricultural Practice

The FAO[1] defines Good Agricultural Practices (GAP) as 'GAP applies available knowledge to addressing environmental, economic and social sustainability for on-farm production and post-production processes resulting in safe and healthy food and non-food agricultural products'. It includes not only environmental issues but also efficiency and efficacy. The ADB as well as the OECD identified several constraints, which are summarised below (ADB, 2013; OECD, 2014).

Threats are:

- State land tenure. Until recently, land belonged to the state and farmers had only tillage rights. This inhibited investments in land: among others maintaining soil fertility and land conservation. As land was no collateral for securing credits, investments in inputs or means of production became troublesome. In addition, land became dispersed among next generation family members. The laws reform will provide farmers tenure or outright ownership. Effective implementations need attention to prevent negative impacts e.g. landlessness. The impacts of the land uses legislations enacted in 2012 are not yet clear (FAO, 2013a).
- Irrigation for rice. If farmers use government-sponsored irrigation systems, farmers have to produce rice in order to meet country's production targets. As growing rice in the dry season is costly, many farmers grow no crops at all.
- Inadequate access to fertilisers and seeds. The capacity of urea processing plant is only used at 25% capacity as the government favours export of natural gas. Most farmers use seeds of their own crops that deteriorate over time and are of poor quality. Even for rice, for which public-private partnerships have been established, the access to improved seeds is limited.
- Inadequate access to finance. According the Asian Development Bank (ADB, 2013) the Myanmar Agricultural Development bank is the sole source for credits. These are mostly for one season and in the past covered only 10% of the production costs; for oilseeds the share is even lower (Shwe, 2011a). Recently, the possibilities have been increased (ADB, 2013). At the moment rural finance is underdeveloped (FAO, 2013a)
- Inadequate extension. Extension workers are active throughout the country; however they are neither well trained nor well supported with funds to reach farmers, with information or with equipment (FAO, 2013a). According to Cho: '...extension officials and extension agents lack the needed knowledge about market driven and pluralistic agricultural extension and advisory systems' (Cho, 2013).

In addition, a weakness of farmers is their competence for coping with these restrictions next to their limited own funds for investments. The development of the sector can be enhanced by solving these

[1] ftp://ftp.fao.org/docrep/fao/meeting/006/y8704e.pdf

weaknesses and constraints. This will enable farmers to grasp the opportunities of a high demand for their products domestically and on the international market.

3.4 Collectors and intermediaries

We made a distinction between collectors/intermediaries and export traders. The first group are intermediates between farmers and stakeholders down streams the value chain, in this study oil processor and export traders. The second group are traders aiming at foreign markets. In this section, we present the trade linked to the farming activities. The description is based on Favre *et al.* (2009) and hence is not very recent (Favre and Myint, 2009). However, the system is still operational and complies with the information we received during our fact-finding mission.
The stakeholders involved are (Favre *et al.* 2009, p61-62):

1. *Primary collectors.* The 'village' collectors procure directly from farmers, provide sometimes credit to farmers and pay farmers after the product is delivered and sold. These collectors sell their product directly to millers or to other intermediaries mentioned below. The costs 'mark-up' for their marketing activities are 5 to 7% of the oilseed purchase costs.
2. *Wholesalers.* They perform several marketing functions. They purchase from primary collectors or employ their own agents or brokers. Some possess good storage facilities enabling supply out of season. Some also act as agent for export traders. The logistics from local markets to urban markets is done by trucks.
3. *Commission agents.* They buy and sell on agreed commission and facilitate the completion of the transaction. Logistics from farm to markets are covered by famers, from the market to oil mill by the millers. These agents charge 1 to 2% of the purchase costs. Traders work for several large traders or millers based on a trust relationship.
4. *Brokers*. Millers, traders or wholesalers employ sometimes brokers for purchasing seeds. Favre *et al.* mentioned explicitly sesame for exports and soya beans in Shan state: both seeds are in high demand with competition for procuring sufficient quantities.
5. *Millers.* Most millers buy directly from farmers or townships wholesalers. Some farmers bring directly their crop to the mill, based on longstanding relationships. This quantity traded directly by farmer is small.
6. *Crop Exchange Centres (CEXCs).* In 2006/2007, 7 CEXCs were active in the Central Dry Zone. Most are open in the morning. Mandalay was already established in 1935, most others between 1989 and 2007 (see below). The trading is done on basis of samples that are physical available in the exchange centre. Now in Mandalay, around 700 suppliers (2/3) and buyers (1/3) are daily on the trading floor. Negotiations are done solely between seller and buyer. Each buyer has the option to buy from several sellers, all with slightly different qualities, and sellers have also options to trade with several buyers. Based on the presentation of the Mandalay Region Edible Oil Dealers' Association we got the strong impression that this exchange centres functioned appropriate: despite the lacking of widely accepted and enforced formal quality standards.
   From 2000 onwards, all CEXs provide market information services. These services are weekly prices of all commodities and distributed on paper and available in the library of Ministry of Agriculture and Irrigation in Yangon. In addition, 'E-trade' is possible (Favre and Myint, 2009). This service provides electronic updates of prices several times a day to over 2,000 members. During our mission, we did not discuss this topic explicitly; however, we got the strong impression that price information is ample available for all actors. The advanced econometric study on market integration of Soe and Fukuda (2010) is based on a monthly time series from 2002 until 2007. According to Soe and Fukuda, the oilseed markets in the long run are integrated, in the short run improvements are possible (Soe and Fukuda, 2010). Since that study, the use of mobile phones and digital communication technologies (ICT) improved enabling an immediate exchange of information between different regions. Aung *et al.* (2013) concluded that prices were not fully transmitted in the short run but fully in the long run between domestic and export markets. These conclusions give no indication for market imperfections or excess profit of some actors along the value chain. In addition, the consulted stakeholders indicated that the CEXC in Mandalay and Yangon are still active and important for their business. Furthermore, the members of oil millers associations in Myanmar (near to 3,000) and in Mandalay (near 1,200) indicate that in 2014 still large numbers from the millers side are trading on the CEXCs.

Table 3.4
Crop Exchange Centres in 2005.

City	State/Region	Established in	Members
Yangon	Yangon	1994	3,670
Mandalay	Mandalay	1935	1,980
Monywa	Sagaing	1970	720
Magwe	Magway	1990	528
Myingyan	Mandalay	2007	500
Pakokku	Magway	1989	430
Taunggi	Shan	2007	300

Source: Favre and Myint (2009), page 124.

Contractual arrangements between farmers and intermediaries (outgrowers' schemes) are virtually non-existent, as actors see no real benefits in long-term relationships.
Based on the information above and the impressions during our fact-finding mission, we conclude that the marketing of oilseeds is appropriate and competitive. Aung *et al.* (2013) also concluded that the marketing performance of intermediaries were well organised (Aung *et al.*, 2013). However, a strong drawback is the lacking of quality standards. Quality assessment is based on personal experiences, visual and sensory inspections of the seeds. It will be clear that without standards market information is also difficult to harmonise.

3.5 Oilseeds processing crushing and refining

3.5.1 Production of crude and refined oil: overview

The production of edible oil consists of different steps and depends on the desired application. Figure 3.3 shows the process steps from oilseeds to the final product. First, crude oil is obtained from oilseeds by extracting (pressing of solvent extraction). Crude oil is used in extra virgin olive oil but in several cases, it needs to be refined to be suitable for human consumption. Refining aims to remove undesirable properties from the oil. It affects the quality and stability of the product. We will discuss the steps in more detail.

Production of crude oil
The production of crude oil consists of seed preparation and extraction. Seed preparation aims to remove impurities whereas extraction gives the first pressed oil and is the most important step for the yield of the oil (Weiss, 2000). Seed preparation consists of seed cleaning, hulling and conditioning. First, impurities such as straw, dead seeds and soil are removed from the oilseeds by using seed cleaners, sieves, and magnets. Removal increases the quality of the oil and reduces the risk of damaging the equipment (Ferchau, 2000). For a more effective extraction, hulling will be applied by flaking the seeds (Hamm, 2003). Through conditioning, the efficiency of the oil extraction increases. By using heat and moisture, oilseeds are being prepared for oil extraction. Next to the improved efficiency, some enzymes will be deactivated and undesirable impurities became insoluble (Hamm, 2003).

Mechanical extraction or a solvent process removes the oil from oilseeds. In Myanmar, almost all extraction is done in a mechanical way: a screw process extracts oil from oilseeds either with or without the application of heat. In cold-pressed oil, some impurities remain but flavours and colours are retained in the oil (Strayer, 2006). However, cold-pressed oil (mainly applied in Myanmar) has a lower yield and is more susceptible than extraction with the application of heat (Koski *et al.*, 2002). After extraction the oil is mostly filtered, as has been seen on several oil mills in Myanmar.
Solvent extraction, that is rarely applied in Myanmar, aims to get increased oil recovery by separation the liquid from the solid phase (Hamm, 2003; Weiss, 2000). According to Favre *et al.* (2009, p106)) solvent capacity is available but either closed down or are operating at a fraction of their capacity (Favre and Myint, 2009).

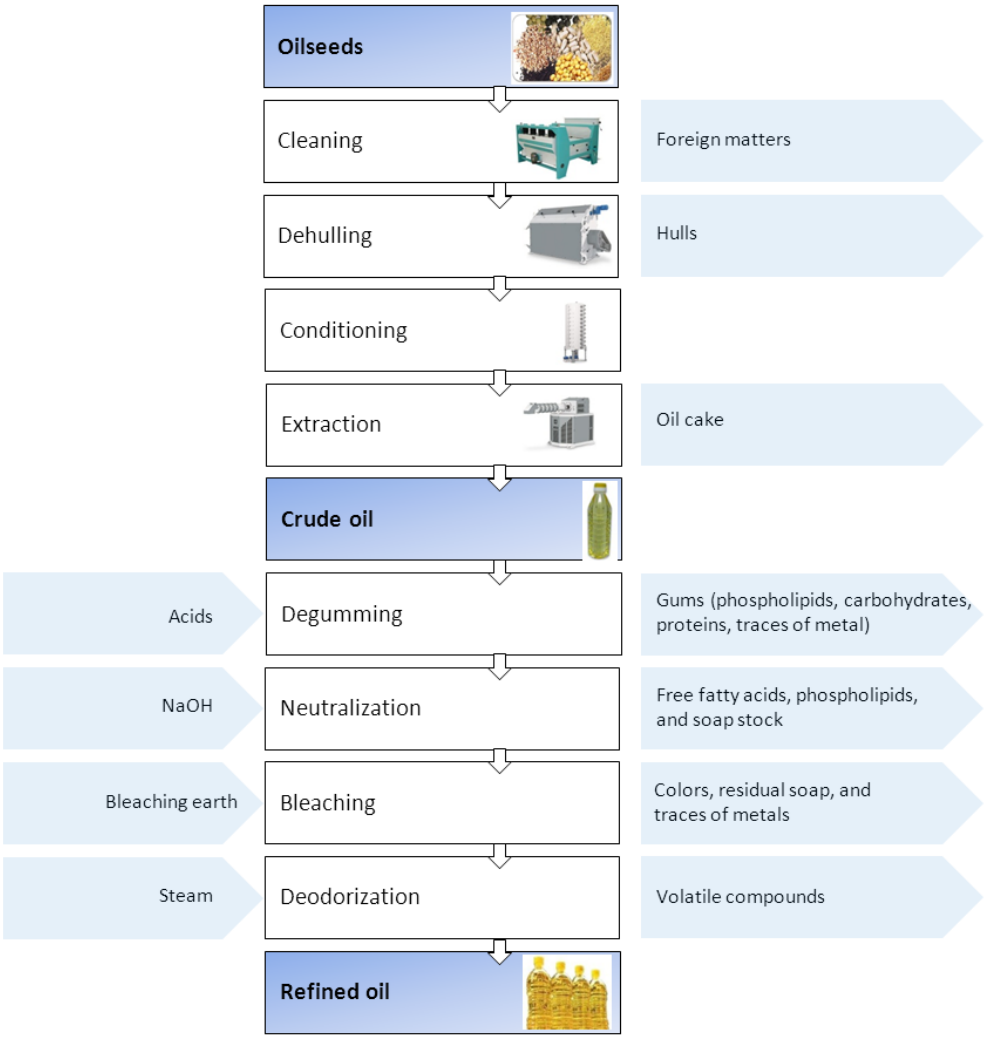


Figure 3.3 *Production of edible oil.*
Source: Lute (2011).

Production of refined oil

Even though oil is mostly not refined in Myanmar, we provide the steps. Undesirable properties and fatty impurities such as phospholipids and free fatty acids from the oil influence the stability (Hamm, 2003, Martinho *et al.*, 2008). Free fatty acids are not attached to other molecules where they are normally attached to glycerol in a triglyceride (Vaclavik and Christian, 2003). In addition, phospholipids are almost similar to triglycerides but contain a water-soluble group instead of a fatty acid (Vaclavik and Christian, 2003). Refining aims to produce a stable oil without impurities and it has the largest effect on the quality and yield of the oil (Hamm, 2003). Refining steps are degumming, neutralisation, bleaching and deodorisation. Degumming by adding acids aims to remove phospholipids; and in addition also free fatty acids and traces of metal (Hamm, 2003). Degumming results in reduced emulsifier properties, minimised refining loss and it makes processing at high temperatures possible (Hamm, 2003). Moreover, neutralisation aims at eliminating the number of free fatty acids and residual compounds named as soap stock. The process will be done at 80-90°C with alkali, generally a sodium hydroxide solution. During a mixture procedure, the free fatty acids should decrease to 0.1% and end up in residual soap. If neutralising is performed poorly, further steps will not operate properly (Hamm, 2003). Furthermore, bleaching takes out impurities as natural pigments, residual soap, and traces of metals. This stage uses acid-activated bleaching earth under pressure (50 mbar). Bleaching aims to get moisture content of 0.1% (Hamm, 2003). Finally, deodorisation is the last step in de production of refined oil and removes volatile compounds that give undesirable flavours. This will be done at high temperatures (200-220°C) and under pressure (4-10mbar) (Hamm, 2003). After all these steps, the oil can be bottled and is suitable for human consumption.

3.5.2 Oil millers in Myanmar

In Myanmar, still a relative large number of oil millers are active. Favre *et al.* indicated that in 2005-2007 the Myanmar Edible Oil Dealers' Association had around 3,600 members and has almost 3,000 in 2014. The scale is predominately small: 2/3 is classified as small, less than 10% as large-scale which means a capacity of over 5 tonnes of raw materials per day. The average size in Mandalay is higher, only 5% small-scale and with 21% relatively many large-scale millers. In Mandalay 75% of all oil-mills stopped functioning, according to the association. Insufficient raw materials are often mentioned as one reason for underutilisation of the mills. Even in the period directly after harvest, the mills are only working 8 hours a day, while 24 hours is possible and more efficient.

Table 3.5

Members of oil millers' associations in Myanmar and Mandalay.

Category	Raw-materials capacity / 8hrs	Myanmar	Mandalay
Small	<1 tonnes	1,891	64
Medium	1-5 tonnes	827	858
Large	>5 tonnes	268	248
Total		2,986	1,170

Source: Personal communication from Myanmar Edible Oil Dealers' Association and Mandalay Region Edible Oil Dealers' Association.

The main constraints and threats mentioned by oil millers are:

1. Insufficient raw materials hampering optimal utilisation of mills. Quality seed for farmers is a key to solving this problem.
2. Strong competition from imported palm oil, which means price pressure on their products. Consumers prefer local oil, but their financial means force them to buy cheaper palm oil.
3. Most mills are outdated, locally and Chinese manufactured, and poorly functioning. They are aiming for mills that meet international standards.
4. Quality standards for raw materials and oil are weakly developed. Formal testing is not available locally and considered expensive if it is done in Yangon. The FAO stated 'oil quality might not correspond to international export standards' (FAO, 2013b).
5. Packaging is sometimes hazardous: drums used previously for ingredients that are unhealthy or even toxic to humans.
6. Refineries for oil are not observed during the mission. Favre *et al.* (2009) indicated that only cotton and rice barn oil is refined, bleached and deodorised (RBD) in government-owned plants. Groundnut, sesame, mustard and niger oils are not refined, as the consumers in Myanmar have a preference for the taste of crude oil.
7. Favre *et al.* concluded that most solvent plants has been closed in Myanmar or functioning far below their capacity. In 2013, the FAO mentioned that installing a modern solvent extractor is still in progress (FAO, 2013b).

The consulted stakeholders were well aware of their position. Changes and improvements are seen as necessary for surviving. They fear disappearing of the small and medium-sized enterprises, scarcity of locally manufactured valuable oil and even the animal protein sector will face problems, as insufficient oil cake will be available. We were impressed by the eagerness to learn and to improve the performance, the interest in export markets and the cooperative openness of the Mandalay edible oil dealers.

Most of the oils are sold by the manufactures themselves, in bottles from 0.25 to 2 litres and in jerry cans or drum for larger quantities. Their bottles have mainly their own brand, collective branding is not observed.

As conclusion, the oil-millers sector is weak in their performance and their awareness of needed improvements and solving constraints is strong.

3.6 Export traders and value chain mark-ups.

Few traders are active on the international market. Nevertheless, sesame seeds are exported to Japan as mentioned in Chapter 2 and mung-beans (also called green gram) are exported to the Netherlands. Both are high quality and food safety demanding markets. Hence, the exporters are able to find certified laboratories quality testing (often foreign) and to handle the export procedures, sometimes handled in Singapore (Ksoll *et al.*, 2013). Favre *et al.* (2009, p62) mentioned backward-integration of sesame export traders aiming at complying with the high-end Japanese market. Despite difficulties, some traders 'are showing signs of success'. The difference in costs for exports to China and Japan are expressed in the Table below. Gross margins are needed to cover the costs of the entrepreneurs for their labour and capital input: the rent of their production factors. These gross margins are significant higher at wholesaler and especially on exporter level for export to Japan (Aung *et al.*, 2013). The higher gross margins indicate the additional efforts for complying with the Japanese quality standards. Despite the higher final export price at the Japanese market, the growers have not only a lower share in the final price, but also a lower gross margin. This illustrates two issues:

1. High-end markets with higher prices are not for each actor in the chain beneficial.
2. Complying with international standards needs to be executed efficiently and cost effective. Myanmar quality standards system needs improvement aiming at lower costs.

Table 3.6

Export mark-ups of sesame seeds from Mandalay in 2008.

Actor	Costs	White sesame to China		Black sesame to Japan	
		MMK/kg	%	MMK/kg	%
Farmer	Production Costs	500.75	29.2	515.65	26.4
	Marketing Costs	14.90	0.9	14.90	0.8
	Gross margin	566.42	33.0	388.19	19.8
	Sale price	1,082.07	63.1	918.74	47.0
Wholesaler	Marketing Costs	26.82	1.6	39.18	2.0
	Gross margin	116.11	6.8	185.40	9.5
	Sale price	1,225.00	71.5	1,143.32	58.4
Exporter	Marketing Costs	76.52	4.5	58.93	3.0
	Gross margin	412.75	24.1	754.33	38.6
	Export price*	1,714.27	100.0	1,956.58	100.0

*Export prices are FOB Shwe LI (Ruili) for China and Myanmar for Japan.
Source: Aung *et al.* (2013).

One of the dealers we interviewed has developed his own quality systems in which he specified for each commodity several issues in maximal percentage such as e.g. for sesame seeds

1. Commodity (Myanmar white, red black sesame).
2. Foreign matter (impurities).
3. Oil content.
4. Damaged seeds.
5. Other coloured seeds.
6. Free Fatty Acids (FFA).
7. Moisture.

These specifications can be adapted to the demand of buyers. This is an important step to quality dedication. However, meeting the international standards such as FOSFA needs to be explored. Except for the few front-runners, in general the Myanmar oilseeds and edible oil traders are weak in their international orientation on market windows, in complying with the international quality standards and in handling export procedures. For seeds export, traders have experience; however for oil the experience is almost not present.

On the other hand, Myanmar has high value oilseeds and edible oils that can be exploited on the high-end consumer markets such as the EU and the USA.

4 The institutional environment of the oilseed sector

4.1 Introduction

This chapter presents the development of the environment on the one hand of oilseeds producers, processors and traders and on the other hand of the food safety and quality regulation and requirements. The development of the edible oilseed sector depends not only on the performance or strengths and weaknesses of the stakeholders within the sector but also on the external developments that enhance or inhibit developments. In addition, food safety and quality legislation including international trade requirements influence the need and performance of testing and certifications laboratories i.e. the NEOQCL.

The past two decades international sanctions against Myanmar were in place and several laws, regulations and restrictions imposed by the government hampered the economic development of the country (PWC, 2014). In 2011, a new government started reforms on several aspects including respecting human rights, freedom of press and liberalisation of the economy. In 2012, the EU lifted all sanctions against Myanmar, with the exceptions of the embargo on arms and equipment that might be used for internal repression (EU, 2013). Several other economies such as the USA and Japan mitigated in a similar way the sanctions, also in 2012 (PWC, 2014).

In this chapter, we will present the business environment for actors in the value chain of oilseeds and edible oil, the agricultural policies and the legislation regarding food safety and quality.

4.2 General business environment

On the competitiveness indicators Myanmar ranks almost at the bottom of all countries in the study of the World Economic Forum (Schwab, 2014). Also compared to all neighbouring countries, doing business in Myanmar will need strong perseverance, focus and empathy from foreign investors. However, the GDP growth and the liberalisation policies and openness to the world market are attractive to focus on this country and to consider investments. Compared to the ranking in 2013, improvements have been made on the labour market efficiency.

Decisions on grasping business opportunities in Myanmar's oilseed sector, with foreign companies, traders or investors, will depend on the opportunities in other countries. Therefore, we benchmark Myanmar against the largest producers of sesame and groundnuts: as is shown in Chapter 2, these are the most important oilseeds in Myanmar. We do not include the high-income countries, as these countries will rank very well and efforts to exploit opportunities will be quite different. The selection of countries next to Myanmar is the top-3 producers and/or exporters of:

- Sesame seeds: India, China, Sudan and Ethiopia.
- Groundnuts we selected China, India and Nigeria.
- Mustard: Nepal.

Myanmar ranks poorly if all 189 analysed countries are included. However, the ranking is in the range of several benchmark countries, which are producers of one of the three mentioned oilseeds. On some issues, e.g. 'Trading across borders' or 'Paying taxes' Myanmar ranks even higher than almost all other selected countries. In Annex 4.1, information is provided on the items that determine each ranking. First, Myanmar needs to deal with safeguarding investments, as is needed in many other countries. Second, as mentioned before, Myanmar aims at liberalisation and openness of the economy. The legislations and governance are changing rapidly. If these developments proceed, the ranking of Myanmar will improve considerably. These expected developments will improve the possibilities of doing business in Myanmar, reduce transaction costs and safeguard investments. In the next section, we will present some of these developments.

Table 4.1

Ranks of 'doing business' indicators (rank 1 = best, 189 = poorest)

	Myan-mar	China	Ethio-pia	India	Nepal	Nigeria	Sudan	Tan-zania
Overall: Ease of Doing Business	182	96	125	134	105	147	149	145
Starting a Business	189	158	166	179	97	122	131	119
Dealing with Construction Permits	150	185	55	182	105	151	167	177
Getting Electricity	126	119	91	111	98	185	113	102
Registering Property	154	48	113	92	24	185	41	146
Getting Credit	170	73	109	28	55	13	170	130
Protecting Investors	182	98	157	34	80	68	157	98
Paying Taxes	107	120	109	158	126	170	108	141
Trading Across Borders	113	74	166	132	177	158	155	139
Enforcing Contracts	188	19	44	186	139	136	154	42
Resolving Insolvency	155	78	75	121	125	107	89	134

Source: http://www.doingbusiness.org/data

Some specific constraints for the agricultural sector have already been mentioned in the previous chapter. In addition, some other constraints negatively affect the development of the agricultural sector (ADB, 2013):

- Poor rural infrastructure. Roads, bridges and ship landings are in poor condition. This limits access to markets, storages and postharvest facilities and increases costs.
- Inadequate irrigation. Although new reservoirs and irrigation schemes have been built in recent years - in 2007-2008 the government invested around MMK100bn and increased that amount to MMK250bn (USD250m) in irrigations (FAO, 2013a) - there are no tertiary and field-level canals or they are in poor condition. Farmers have no incentives (lacking land rights) and resources to build those themselves.
- Inadequate flood control. Much of the low-lying delta region is subject to flooding, resulting in crop or yield losses.

4.3 Agricultural policy

Agriculture development is the first priority of the national economic policy. It states that the development of the agriculture sector is 'the base of the development of others sectors of the economy' (OECD, 2014). The three agricultural policy objectives are:

1. Food security.
2. Export promotion.
3. Increase farmers' income and welfare.

To achieve these objectives more specific objectives have been set: achieving a surplus in rice production, reaching self-sufficiency in edible oils, and stepping up production of exportable pulses and industrial crops.

The policy priorities for 2012-2015 aim at boosting 'the agricultural productivity by increasing extension services and government loans, removing barriers throughout the supply chain and promoting demand-oriented market support mechanism'. Unfortunately, for the oilseed sector, the key interventions focus on rice production and other products (horticulture and livestock) in the dry season (OECD, 2014). Furthermore, the longer-term objectives (period 2001-2030) aim at removing all constraints for several stakeholders mentioned before.

The Ministry of Agriculture and Irrigation in Myanmar indicated six key factors to ensure the development of the crop subsector (MoAI, ca. 2014):

1. 'Strengthening of profitable and sustainable market for farmers;
2. Utilisation of good quality seeds to produce quality products for higher price;
3. Utilisation of Good Agricultural Practices (GAP)
4. Application of agricultural inputs such as irrigation water, chemical and natural fertilisers efficiently;

5. Encourage to establish agro based industry which can be produced value-added product from agricultural raw material;
6. Reduction of production costs and transactions costs along the supply chain (from seeding to market)'.

MoAI indicated that they are open to international cooperation or support to implement their ambition. Figure 4.1 shows their approach.

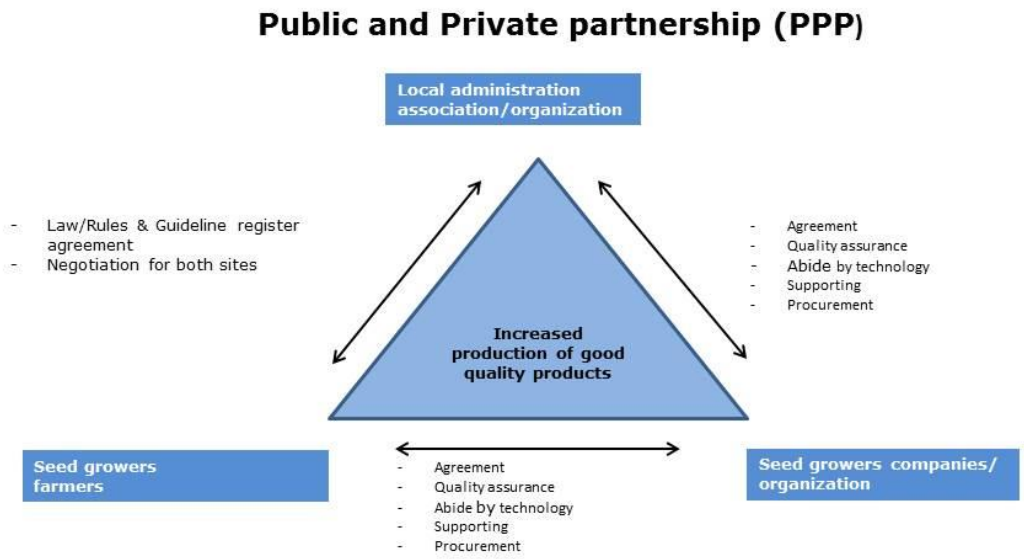


Figure 4.1 *Department of Agricultural approach to strengthening the agricultural sector. Source: MoAI (ca. 2014)*

In March 2012, Myanmar enacted two land laws, the 'Farm Land Law' and 'Vacant, Fallow and Virgin Lands Management Law'. These two land-use legislations cover land management, farmers' rights and tenure, the role for the private sector, foreign investment as well as procedures for land-conflict resolution (FAO, 2013a). The OECD (p315-324) assessed the possible impacts of the land laws (OECD, 2014). We will not repeat their analyses but some conclusions are presented (OECD, 2014, p321). Customary land rights are weakly recognised, particularly for shifting cultivation. The complexity of land classifications creates confusion and uncertainty. Furthermore, the classifications remain rigid, impeding land users from registering their rights. The Settlement and Land Records Department, responsible for registering and taxing land, lacks capability and sources to properly record rights on a cadastral map. In addition, existing dispute resolution mechanisms may not allow a fair recognition of existing land rights. All these issues hinder investments in agriculture, e.g. in soil fertility or in irrigation works. At the moment, only 20% of the land in Myanmar has been registered.

The objectives of the Government are challenging and supporting the agricultural sector. However, a study for USAID Myanmar mentioned 'unpredictable policies' as a major constraint to the development of the agricultural sector. Despite recent relaxation of production and land allocation controls at the farm level, farmers are still directed to grow specific crops (such as paddy crops). Meanwhile farmers wished to diversify into high value crops and production activities or into export crops. Growing export crops was further discouraged by trade restriction or clarity about exports procedures (USAID, 2013). Also, the OECD (2014) recommends promoting free choice of crops for farmers, increase trade policy predictability and expand the credit coverage of the Myanmar Agriculture Development bank.

4.4 Food control system of Myanmar

This section discusses the organisation and functioning of the Food Control System of oilseeds and edible oils in Myanmar. A Food Control System consists of five components (Lin and Yamao, 2012):

1. Legislation.
2. Control management.
3. Inspection.
4. Laboratories.
5. Information, Education and Communication (IEC).

Table 4.2

Scheme of the Myanmar Food Control System on edible oils.

	Responsible organisation(s)	In place	Not in place
Food legis-lation	Ministry of Health, Food and Drug Administration (FDA)	National Food Law 1997 Development Committee Law 1993	General Food Safety Law
	Ministry of Industry	Industrial Law	Standards Law
	Ministry of Agriculture and Irrigation	Pesticide Law 1990	
Food control management	FDA (finished food products)	Leading in Myanmar food issues: Domestic processing: Good Manufacturing Practices (GMP) for industries, Good Hygienic Practices (GHP's) for SME's GHP and checking of compliance to international standards for food imports Health certificates for food exports	Overlap of competences Control of family businesses Control of imports in border areas
	Ministry of Commerce	Supervision of export and import licences	
	Ministry of Industry, Directorate of Industrial Coordination & Inspection (primary food processing)	Licences for food manufacturing	
	Ministry of Agriculture and Irrigation, Plant Protection division of Myanmar Agricultural Service	Phytosanitary control of domestic and imported agro products	
	City Development Committees	Control of local, small scale, food production	
	Department of Agriculture (MoAI) National Edible Oil Quality Control Laboratory (NEOQCL),	Safety policy issues edible oil sector	
Inspection services	FDA	Inspection of food factories	
	Ministry of Commerce, Myanmar Inspection and Testing Service (MITS)	Inspection imports and exports	
	Private companies	Inspection imports and exports	
Laboratory services	FDA, Food Quality Control Laboratory (Yangon, and Mandalay)	Control of finished products	Lack of capacity, training, equipment
	Livestock Breeding and Veterinary Department Lab	Control of feed	
	Fishery lab	Control of Fish	
	Plant Protection of DoA, Oil Crops Lab for chemical residues analysis	Control of residues	
	Commodity Testing and Quality Management	Control of food products?	
	Food Industries Development Supporting Laboratory	Control of food products for members of Myanmar Food Processors & Exporters Association	
	NEOQCL	Control of edible oil, developing of standards, support edible oil processors	Inauguration, trainings, means (chemicals), national standards, ISO17025 accreditation
Information, education, communi-cation and training	FDA	Coordination ministries Improving of food safety awareness among producers and consumers	
	Department of Agriculture (ex Myanmar Agriculture Services (MAS)	GAP training for farmers	
	Ministry of Commerce	Consumer protection	
	NEOQCL	Improving of food safety awareness among producers and importers	

Legislation

The first National Food Law of Myanmar went into force in 1997. The four objectives are:

- To enable the public to consume food of genuine quality, hygienic and free from danger.
- To prevent the public from consuming food that may cause danger or are injurious to health.
- To supervise systematically production of controlled food.
- To control and regulate the production, import, export, storage, distribution and the sale of food systematically.

The National Food Law has no separate defined and published policy on food safety as part of food policy. The enforcement of the National Food Law was found to be weak (Lin and Yamao, 2014). There is not yet a Standards Law. The Myanmar Food and Drug Board of Authority (MFDBA) has been created based on the National Drug Law, This Board -chaired by the Minister of Health-, lays down inter alia policy, guidance on production, distribution, import, export, quality assurance, standards setting and labelling. Based on the same National Drug Law, a Food and Drug Administration (FDA) has been created as a separate Department of the Ministry of Health in 1995. The FDA is the contact point within the government of Myanmar for the Codex Alimentarius Commission. The FDA has two divisions: a food and a drug division. Each division has enforcement and laboratory units. The Food Enforcement unit comprises of regulatory affairs, inspection, training and advisory services. The Food Laboratory unit has food and water, microbiological and chemical laboratories.

The need to update the Myanmar Food Law (dates from 1997) was emphasised during our visit to the Food and Drugs Administration (FDA) and international support will be welcomed. The timeframe for the new Food Law is two years. An update of the Myanmar Food Law is urgent, as new concepts are available. Those are developed in the nineties of the last century as response on international food crises (e.g. BSE or dioxin). Furthermore, new technologies like biotechnology requests attention. In the framework of the Codex Alimentarius Commission, a new Task Force on Biotechnology has been created. Moreover, the liberalisation of the Myanmar economy and the expected increase in international trade will have implications for food safety control in Myanmar. In the framework of the Asia - Europe Meeting (ASEM) the European Commission could assist the Myanmar government with updating its National Food Law.

Food Control Management

Five ministries and the private sector are involved in the food control management. Key-actors in this system and their responsibility are summarised in Table 4.3.

Table 4.3

List of main actors and their responsibilities in the control of oilseeds and edible oil.

	Actor	Responsibility
1	Ministry of Health (Food and Drug Administration)	Coordination, domestic processing and health certificates for export and import
2	Ministry of Commerce	Trade (supervision of export and import certificates)
3	Ministry of Industry	Large scale processing
4	Ministry of Agriculture and Irrigation	Crops, primary products
5	Ministry of Science and Technology	Standards setting
6	Private sector and Associations	GAP, GHP, GMP, HACCP, laboratories

Within the Ministry of Health, the relevant body on food control is the FDA. The food control of the FDA is divided in three groups: 1) food import, 2) food export and 3) domestic food production. Imported food and food to be exported must comply with the National Food Law but also with international and regional standards. Myanmar is member of respectively the Codex Alimentarius and the Association of Southeast Asian Nations (ASEAN). However, food imported from border areas are not under strict control due to limited capacity and smuggling. For food to be exported, the FDA tries to fulfil the requirements of the importing country, such as issuing an export health certificate. The FDA encourages the food manufactures (large-scale enterprise) to implement the Hazard Analysis Critical Control Point (HACCP) concept and the Risk Analysis approach. The FDA also issues Good Manufacturing Practices (GMPs) recommendations for food manufacturing factories. Finally, the FDA

inspects GMPs by those factories and conducts microbiological and chemicals tests at their laboratories. The FDA issues recommendations of Good Hygienic Practices (GHPs) for SMEs. Food produced at family business level is still exempted from applying FDA recommendations.

The Ministry of Commerce, supervises the issuance of export and import licenses by checking the recommendations from the relevant ministries concerning standards, prices and trademarks for all imported and exported products. The Seed Laboratory in the Ministry of Agriculture and Irrigation is responsible for monitoring Maximum Residue Levels (MRLs) of pesticides in seed to be in accordance with MRLs harmonised in ASEAN. The Plant Protection Division of the Department of Agriculture is also responsible to issue import certificates, in accordance to the Plan Pest Quarantine Laws (1993).
The Ministry of Industry is the licensing authority for the establishment of manufacturing factories in general. GMPs are mandatory in the food processing industries. The precise responsibility of this Ministry with regard to food safety is still a question mark, as the statements of our representatives at different ministries were not consistent. The Ministry of Science and Technology is responsible for standard setting. Standards concerning food safety are based on data from the FDA. If national standards on food safety do not exist yet, Myanmar will follow standards of the Codex Alimentarius. This is, in general, common practice in developing countries.

We - the Dutch delegation - tried to understand the coordination between the ministries with a responsibility on food safety at length. We showed a scheme of the Food Control System of Myanmar and a list of relevant actors in this system. We raised two questions: Is this scheme correct and if not, what is incorrect or lacking? 2. Is the current system working well and if not, why? We visited the Food and Drug Administration of the Ministry of Health, the department of Agricultural of the Ministry of Agriculture and irrigation (MoAI) and the Ministry of Commerce. The Dutch delegation had not the opportunity to visit the Ministry of Science and Technology but got the opportunity in meeting a representative during the workshop.

The FDA acknowledges that with regard to the division of responsibilities on food safety, no clear demarcation of responsibilities between the relevant Ministries ('no clear cut') exist. Upgrading the FDA to a separate department has strengthened the position of food safety in the Ministry of Health. The MoAI is responsible for the control of crops (primary products) but as soon as the oil is in the supermarket, the control on the oil is the responsibility of the FDA. A Pesticides Registration Board, in which all relevant ministries are represented, is responsible for the coordination concerning pesticides. An Economic Committee - which meets once a month - coordinates between the relevant ministries on commodities, in general. The representative of the Ministry of Commerce specifies the subjects of discussion: quarantine, food safety, import and export policy. With respect to management in order to export edible oils, the Myanmar edible oil is not qualified. He acknowledges that there is a need to increase export. The Ministry of Commerce does not consider free trade as problematic. Myanmar, as member, has to face the challenge of free trade in ASEAN. Myanmar wants to export value added products and to import technology. Within ASEAN, several bodies have been formed to lead programmes on food safety, standards and capacity building. The ASEAN Expert Group on Food Safety (AEGFS) provides the overall oversight, facilitation and coordination of food safety activities in ASEAN. Then there is the ASEAN Food Safety Improvement Plan (AFSIP) that consists of the ASEAN Food Safety Policy and Plan of Action. Of the ten programme areas, the following five have been identified as priority areas, i.e. legislation, laboratory, food inspection and certification, information sharing, and consumer participation and empowerment. In addition, several other regional initiatives are, such as the EU-ASEAN Economic Cooperation Program on Standards, Quality and Conformity Assessment (Food Sector) 2003-2005, under the ASEAN Consultative Committee for Standardization and Quality.

According to representative of the Ministry of Science and Technology if Myanmar exports it has to adapt the standards of the importing country. If Myanmar will import, it has no national standards to comply with, so Myanmar is willing to accept everything. This statement is in line with the FAO (2013b, p2), findings:

> 'Finally, the lack of any form of national standards for edible oils in Myanmar posed serious risks to the quality of exports, making the effective oversight of the quality of imported oil impossible. The definition of appropriate standards was therefore required, as was the draft and enactment of the

necessary legislative and administrative procedures and the establishment of a laboratory for analysis.'

Inspection
Food inspection services are performed either by government agencies or by independent organisations that have been officially recognised by national authorities. FDA inspection as part of food control measures focuses on 1) inspection of food manufacturing (for conformity assessment) and 2) pre and post market surveillances for food marketed (either imported or locally produced food) on the domestic market. One public and some private authorised inspection and verification organisations are involved. Sampling of food for FDA's fit-for-consumption certificate is occasionally collected by the Myanmar Inspection and Testing Service (ITS): a public inspection organisation. In the field of the export and import sector, these public and private inspection teams can be considered as the main player of the inspection services. The inspection covers few items (Lin and Yamao, 2014). Almost all the inspectors have attended an in-house training, more than half of them attended training conducted by other departments and only very few attended training conducted by foreigners.
No research has been done on the efficacy of the Myanmar inspection: this is therefore a question mark.

At the border areas, the plant protection division of the MoAI operates seven entry-point inspection stations for inspections of agricultural products but works with very limited technical capacity and facilities. In fact, there have been a number of challenges regarding the safety aspect of contraband foods especially from China and Thailand border routes. Smuggling of goods into and from Myanmar is pervasive.

Laboratories
Myanmar has public laboratories and private laboratories. Most government laboratories need upgrading, except the NEOQCL and the (accredited) Fisheries Laboratory. No laboratory for oilseeds and edible oil is accredited. Chapter 6 presents an overview of laboratories.

Information, Education and Communication (IEC)
Governments can use IEC to educate consumers about food safety and quality, and encourage the food industry to adopt Good Agricultural, Manufacturing, Hygiene and Handling Practices. Sharing information, education, and advice among stakeholders across the from-farm-to-fork continuum is essential to enable food safety programmes reducing the incidence of food-borne disease. Promotion of food safety awareness of food producers by using IEC materials is one of the priorities of FDA to reduce food safety risks. Carrying out these IEC activities on food safety, FDA is working together with other departments such as Agriculture, Fisheries and Veterinary affairs involved in food safety control. The transparency of the IEC in Myanmar is weak (Lin and Yamao, 2014), the efficacy of the IEC activities is a question mark.

The FDA has been conducting a food-safety education training programme. Examples are training on Good Manufacturing Practices for factory managers, training on food safety for food handlers, restaurant managers and processors to increase awareness, training on food hygiene and risk, or training on food analysis especially for border point inspection. The awareness promotion among consumers, programmes such as proper hand washing, adequate cooking, and avoiding cross-contamination in food preparation are being broadcasted. Regarding the education programme in the agriculture sector, Good Agricultural Practices training conducted by the Myanmar Agriculture Service helps to reduce the use of agrochemicals for improvement of food safety and quality of agricultural products.

Myanmar has only recently (14 March 2014) a Consumer Protection Law. It has also two consumers' organisations: the Consumer Protection Association and the Myanmar Consumer Union. Within the Ministry of Commerce, a Department of Commerce and Consumer Affairs has been created. This Ministry, being the official focal point of the ASEAN Committee on Consumer Protection, is engaged in consumer protection activities such as preparing a consumer complaints scheme and the promotion of awareness of consumers. A Consumer Protection Law is expected soon. The Myanmar Consumer Union

and the Myanmar Consumer Protection Bodies have been also formed which can be important forces for change in food safety and standards.

Concluding remarks: The analysis above shows that the Myanmar Food Control System is still not robust enough. There are plans to revisit the National Food Law of 1997, as in the Codex Alimentarius new concepts on food safety have been developed. Myanmar has no Food Safety Law, nor a Standards Law. A revised General Food Law could include those specific laws or a reference could be made to separate specific laws. The enforcement of the National Food Law was found to be weak. There is no clear demarcation of responsibilities between the Ministries concerning food control management. The inspection of FDA covers very few food items. Most government laboratories need upgrading, except the NEOQCL and the Fisheries Laboratory. The transparency of the Information, Education and Communication on Food Safety in Myanmar was also found to be weak. Given this state of art, the government should strengthen the Myanmar Food Control System. In this effort, the government of Myanmar could use the help of international donors and organisations.

5 SWOT analysis of the Myanmar oilseeds business

5.1 Introduction

To analyse the opportunities we will follow 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 frequently for industries or sector as we do. The latter means the use of aggregated data of companies as well as macro-economic data. The consequence is that even if no opportunities are identified for the sector, individual firms with specific competencies might operate very successfully. The Strengths and Weaknesses are derived from the developments and performance of actors in the internal environment and the Opportunities and Threats (SWOT) from the external environment. 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.

The industry's strengths and weaknesses, the internal environment, have to be categorised. 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, organisational, 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 cost price below average. Abundant availability of labour of land or best practice yields, as such, are not competitive advantages, they are an advantage if it results in a lower price or a better quality for the same price compared to the competitors. The scope of analysis is thus a comparison with the performance of the competitors on a specific market.

In this chapter, we will focus on sesame seeds and groundnuts. These seeds are specialties on the world market: low volumes with a price premium. Due to lacking data and information we will not discuss niger seeds and mustard seeds, both are also specialties. These might be subject of a follow-up study. Other oilseeds grown in Myanmar such as soya beans and sunflower seeds are commodities that are grown in large volumes in other countries. For these commodities, it will be very difficult for Myanmar to compete on the world market due to its relatively low volumes, high handling and transport costs. Nevertheless, these crops are important for domestic use as edible oil, as protein sources for human consumption or as cake for animal feed.
First, the Strengths, Weaknesses, Opportunities, and Threats (SWOT) of the Myanmar oilseeds sector will be presented. Next two selected strategies will be discussed: 1) Export orientation and 2) Domestic orientation. In the last section, we present an overview: being a world market player or opting for a cumbersome existence.

5.2 SWOT of the oilseed sector

In this section, we provide an overview of the SWOT elements of the oilseed sector and its environment. The strengths and weaknesses are presented in the Table below. The strengths of the value chain are:

1. Oil millers are aware of the need to update the equipment, are eager to learn and are willing to cooperate with farmers to increase the production
2. Quality awareness is in development and exporters have access to certified quality laboratories.
3. The performance of collectors/wholesalers and Commodity Exchange Centres are proficient.

The weaknesses for the value chain are:
1. Not enough raw materials are produced, neither for processing nor for export.
2. Farmers lack sufficient resources and capabilities to increase the production, even though oilseeds have better margins than rice.
3. Oil millers are underutilising their out-of-date equipment.

Table 5.1

Strengths and weaknesses of actors in the Myanmar edible oil value chain.

Actor	Strength	Weakness
Input suppliers	International company active in seeds.	• Availability of quality seeds and other inputs. • Interaction with farmers on GAP.
Farmers	• Growing oilseeds. • Economic margin/return of oilseeds higher than of rice.	• Capabilities and competences in GAP. • Insufficient resources (capital) or collaterals. • Yields are on the low side. • Little investments in irrigation.
Collectors/ intermediaries	• Performance of Crop Exchange Centres. • Numbers of sellers and buyers at CEXCs. • Transparent price information. • Storage capacity. • Fair costs for their services.	• Little formal quality awareness: no testing. • No standardisation of seed quality.
Oil millers	• Produce cold pressed oil with a taste that is valued. • Experienced visual and sensory testing of seeds. • Aware of their bottlenecks and eager to improve. • Direct contact with their buyers. • Cooperative attitude and sharing ideas.	• Consumers do not pay for oil specialties. Imported RBD oil is cheaper. • Underutilisation of the mills. • Procurement of sufficient raw materials. • Little formal testing. • Equipment is not up to date. • Using drums and packaging not suited for food.
Export traders	• Experience in export of seeds to high-end market (Japan and EU). • Use certified laboratories. • Quality standards developed.	• Export volume of seeds is small. • Little export of high value oil. • Procurement of sufficient raw materials. • Tracking and tracing of seeds. • International market orientation. • Export to high-end markets is costly.
Laboratories		• Basic testing locally insufficient available or recognised. • Price is seen as high.

Table 5.2

Opportunities and Threats for the actors in the Myanmar edible oil value chain.

Actor	Opportunity	Threat
Consumers	• Growing demand for edible oil.	• Imported palm oil is very competitive.
Infrastructure	•	• Roads, electricity supply. • Seaport facilities. • Irrigation.
Doing business environment	• Liberalisation of economy. • Membership ASEAN: access to markets.	• Long term land leasing uncertain • Credit facilities. • Protecting investment. • Contract enforcements. • Handling export procedures. • Membership ASEAN: competition from ASEAN countries.
Government	• Self-sufficiency of edible oil. • Increasing capabilities and profitable of farming.	• Efficacy of government. • Resources and capabilities to implement policies. • Priority to rice. • Low food safety focus.
International demand	• Prices for sesame and groundnuts products. • Large neighbouring country with increasing demand. • Cold pressed oils have a valued taste.	• Quality certification is a must (FOSFA conditions). • Using drums and packaging that is not suited for food and international trade.

The opportunities and threats are summarised in Table 5.2. Except for opportunities on the international market, the external environment is supporting poorly the developments in the edible oil sector.

5.3 Opportunities on the international market: export strategy

The opportunities on the international market are twofold: the high-end markets at relatively long distance and neighbouring countries with formal or medium food safety and quality criteria. As illustrated afore, at the high-end market, a higher price can be made but also the criteria to fulfil are higher and most probably rather costly. In the Figure below, we depicted the relative position on imported quantity (average 2011-2013) and growth of those imports in the period '2001-2003' until '2011-2013. To mitigate annual fluctuation we took a three annual average. The quantity is an indication of the importance of the country as importer. The growth indicates a possible development in the future: continuation of the developments in the past.

For instance, China is the major world importer (one-third in 2011-2013 of all imports) of sesame seeds and the share on the world market grew considerably (from 4% in 2001-2003 to 33% in 2011-2013). For sesame oil, USA is an important importer and also growing in volume, but the market share is in 2011-2013 smaller than in 2001-2013. The imported volume in China grew faster. In other words, the imported volume is growing in all countries; however, the imported volumes by China and India grew faster than the total world imports. The opposite development can be observed for groundnut oil, the total import volume decreased and relatively stronger in the high-end markets, due to allergen risks. We need to emphasise that all values in the Figure are relative: standardized deviation from average. The real values are presented in Annex 5, including the method for calculating the Z-scores.

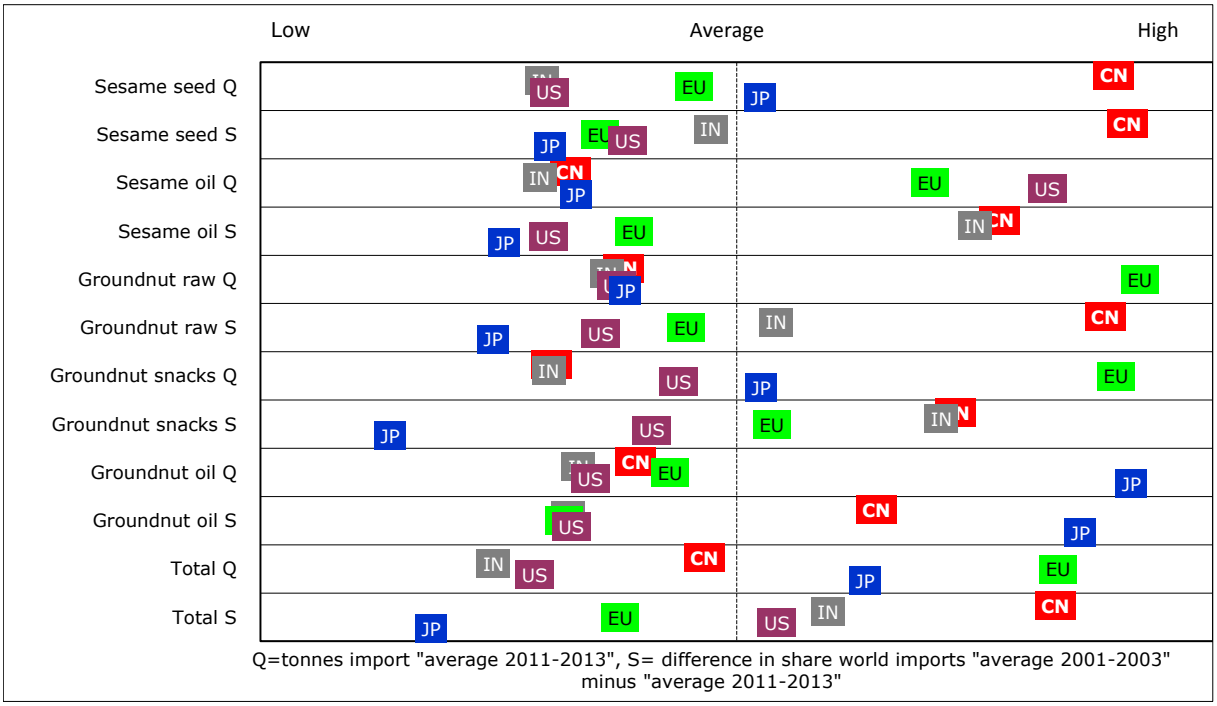


Figure 5.1 *Relative import positions of countries for sesame and groundnut products (based on Z-scores).*
CN=China, EU= European Union, IN=India, JP=Japan and US= United States of America.

China is an attractive market window for *sesame seeds* as it is an important importer. The relative price is 80%, whereas the Japanese price is 90% of the average world-market level in the period 2011-2013. If new high-end market will be explored, the EU-market will be more attractive, as it pays a small premium price (104% of the world market level) or the USA with a significant premium: 120% of the world market price. For *groundnuts,* the EU is the leading importer: 60% of the total and hence, the first market to be considered. For edible oil, Myanmar has little experience and furthermore only crude oil is produced. For *sesame oil,* the USA (26%) and the EU (19% import share) are the most important markets. For *groundnut oil,* the EU is also the leading market with a market share of 80%. However, China with a share of 20% can also be taken into account. It will be clear that border trade, not captured in the official statistics, are not taken into account.

We recommend focusing on maintaining and/or entering selected markets. For the neighbouring country, with an import demand of formal or medium food safety safeguards, we recommend focusing on China. It is an important market for several products and the imports are growing fast. The GDP per capita is USD6,800, which is far above India (USD1,500) and, in addition, increasing annually by almost 10% (see Section 1). For the high-end market, we recommend focusing on the EU. For several products, their imports are above the level of the USA or Japan. Furthermore, the imports grow faster for most products than the imports of the USA or Japan. The GDP in the EU is on average at the same level as the USA, however in all 3 mentioned high-end countries the growth of the GDP per capita is below 1%.

In conclusion, relevant markets window for Myanmar are China as fast growing market with medium food safety levels and the EU market as leading importer for the product portfolio that can be supplied by the Myanmar oilseed sector. This focus does not exclude other countries or markets. Business is done by enterprises and their ambition and performance is leading. Many market niches can be exploited beneficially, even if they are not identified in this study.

5.4 Domestic orientation

Many stakeholders mentioned palm oil as a major threat: it is cheap and of a lower quality. Indeed the price on the world market is far below the price of groundnut and sesame oil. In contrast, for most purposes such as cooking or frying, palm oil is an excellent oil and hence economically beneficial for consumers. Furthermore, oil imports are not in line with the government policies of self-sufficiency in vegetable oil and a threat for the oil millers. With more openness of the economy, the competitiveness of the oil millers will undergo a strong pressure. We expect that this development is irreversible and more palm oil will be imported. These imports will deteriorate the economic returns of all stakeholders in the sector. The size of the industry will decrease, will have low margins and many stakeholders will be out of business.

The question is 'How can the competitiveness be strengthened aiming at an oilseed sector with a prosperous future?' In our opinion, an attractive way is accepting the palm oil imports and focusing on the export markets. Myanmar has oilseed specialties and special oils that get premium prices on the world market. To improve the position on the world market the following development should be encouraged:

1. Producing sufficient raw materials at competitive prices.
2. Restructuring and upgrading the oil millers' facilities. The efficiency should be increased (lower underutilisation and higher oil return rates) and creating possibilities of producing Refined Bleached and Deodorised (RBD) oil that is needed for the high end market.
3. Quality consciousness is required to comply with international standards (such as the FOSFA standard).

Such developments are in line with the ambition of the Department of Agriculture of MoAI, however conflicting with self-sufficiency.
As conclusion we expect that substitution of imported oil by domestic production will be very hard and most probable an unattractive troublesome development for all actors in the oilseed value chain.

5.5 Attractive world marker player or cumbersome business

Previously, possible development in the oilseed sector have been indicated. Next to an efficient and increasing production, food safety issues are also of high importance. In the following section, the opportunities for food safety control are elaborated. We distinguish four levels of quality standards from informal to very proficient standards (see Table 6.1). Informal standards are based on visual and sensory testing based on personal experiences, without any equipment needed. Proficient standards includes standards on MRLs, trace elements and testing can only done by sophisticated equipment by highly trained people. The demand for such enforced food safety standards depend on the quality consciousness of consumers and enterprises. High standards are required in the high-end countries. At this moment, in Myanmar quality standards are poorly developed and mainly informal. The demand is based on informal contacts and trust.

Figure 5.2 shows the possible development in Myanmar. In the *present situation*, almost all domestic products can be categorised in the section low standards and low quality consciousness. A small share of the exported products are in the medium (China) or high-end (Japan) quality standard level. The imported palm oil fulfils at least the medium standards. That is the reason that is depicted in upper level of standards, and in the middle of quality consciousness, because of Myanmar's level.

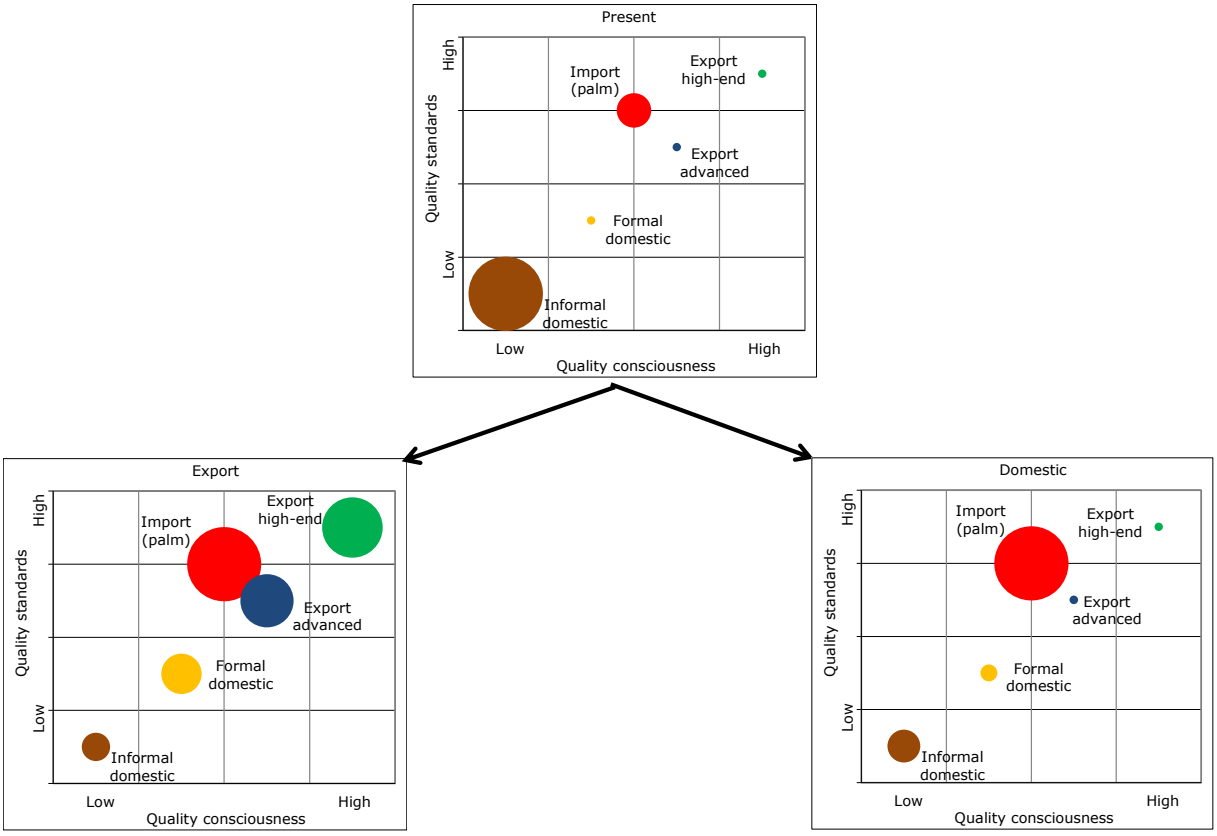


Figure 5.2 *Tentative developments* of the Myanmar oilseed sector.*
** Bubble size indicates market size*

The *export strategy* seems contradicting: more imports of palm oil, lower use of domestic products (squares left-under). However, the exports to medium and high-level countries is significant larger. These export possibilities originate from substitution of consumption of domestically produced oil by imported palm oil and secondly by a higher production of raw materials and edible oils. The economic benefits for the country (around USD1bn) are illustrated at the end of Chapter 2. Key factors are:

1. An adequate food safety control system otherwise the medium and high-end markets cannot be entered.
2. An efficient production system, that produce at competitive prices and have higher production levels to satisfy the domestic and international demand (see Section 3).
3. Understanding and fulfilling the requirements of the medium and high-end markets. Market intelligence and business contacts will be essential.

To become a world market player at all levels of the supply chain a boost is needed: A higher, more efficient and market oriented production.

Finally, the *domestic orientation* will be the future if no actions are taken. More palm imports will threaten the domestic production. Price pressure will result in the long run in a shake out of firms in the industry.

6 A certified laboratory oilseeds and edible oil sector

6.1 National Edible Oil Quality Control Laboratory

The National Edible Oil Quality Control Laboratory (NEOQCL) has been built as part of the 'Oil Crops Development Project'(Favre and Myint, 2009); an ambitious project financed with a loan of the OPEC Fund for International Development (OFID) and executed by FAO, with as counterpart the Department of Agriculture (DoA) of the Ministry of Agriculture and Irrigation (MoAI). The project started in July 2006 and was completed in February 2013.
The 'Oil crops development project' (FAO, 2006) would focus largely on developing oil palm and four oilseed crops - sesame, groundnut, sunflower and soybean - among farmers in 36 townships. Works would include:

- Upgrading of laboratories and seed harvesting and cleaning facilities.
- Construction of seed conditioning plants and storage areas.
- Creation of a seed capital fund.
- Construction of new solvent extraction plants capable of processing 100-150 tons of seeds per day.
- Construction of a new palm oil mill in Dawei and increasing the production capacity of a seed refinery in Yangon from 15 to 50 tons per day.'

The value chain wide approach of FAO and the MoAI (Favre and Myint, 2009) had apparently many positive practical impacts (FAO, 2013b), but the above-described constructions of plants were very difficult or impossible to implement. FAO mentions in her Terminal report of 2013, that the government has adopted many recommendations and that this contributed to the liberalisation of imports and exports of oil crop products (FAO, 2013b). The project did not lead to a clear national policy on edible oils yet. In fact, the actual policy on edible oils has been hardly discussed in official documents in Myanmar since the edible oil project was implemented, which is in sharp contrast with the policy on the 'staple food crop rice' during the last decades and the policy for the horticulture sector, more recently. The developments of the Edible Oil Development Project is not isolated from the important changes in the political system of Myanmar, with the related changes in ministries, in state owned companies and trade policy. The term of the project, 2006 - 2012, was very turbulent in this respect.
The upgrading of laboratories resulted mainly in building NEOQCL. In the report of FAO this was described as follows (FAO, 2013b, page 11):
'The National Edible Oil Quality Control Laboratory (NEOQCL) was originally designed to be a small laboratory for routine analysis of vegetable oil, yet following the refurbishment of an old building close to the PMU office, the project team acknowledged the importance of a laboratory in line with ISO 17025, the international standard for the accreditation of testing laboratories. The project contributed to the design of a modern laboratory and purchased the equipment required. Ten staff members from the NEOQCL and 20 from other government institutions were trained in the working principles of various pieces of equipment and safety in the laboratory, including toxicological issues.'
DoA, the former Myanmar Agriculture Services (MAS) of MoAI, owns the laboratory. The building and set-up has been finished in 2012, but until now the laboratory has not been operational officially. The facilities are still in excellent technical condition and the manager and staff have used the laboratory for their own trainings, with the limited means that were available. They are still very motivated to start testing and researching for third parties.

The mission of NEOQCL is to promote food safety and quality of edible oils in Myanmar. The objective is to build confidence in quality measurements by the development of validated methods, reference measurements, inter-laboratory comparisons and training. The laboratory will provide scientific-proven evidence and scientific guidance to support Myanmar edible oil policies, standards and international trade. NEOQCL aims at a major role on the improvement of the quality of imported/exported oils and the reduction of fraudulence practices (personal communication with NEOQCL). NEOQCL is committed to:

- Guarantee and continuously improve the excellence of its operational results and management system.
- Provide transparency in all quality related activities and responsibilities.
- Assist Myanmar edible oil sector by regular monitoring of oil quality parameters.
- Interact with the appropriate sectors of the food sector to promote export/import quality standards.
- Advice on good manufacturing practices in the oil sector.

The ambitions of NEOQCL are broader than testing or advices regarding food safety. The laboratory wants to play an important role in improving the quality of edible oils and wants to support the Myanmar edible oil sector. In the FAO evaluation report (page 12) on the 'Oil Crops Development Project' the laboratory is considered as 'a key element in enhancing the competitiveness of Myanmar in the international edible oil sector.' (FAO, 2013b). Because of the problems the 'Edible Oil Crops Development Project' faced during the implementation period (2008 - 2012), the role of the NEOQCL did not live up to its promises until now and brought it in an isolated position. This isolation was probably strengthened by the fact that the laboratory was established under the MoAI, while the Ministry of Commerce (MoC) was responsible for quality and quantity improvement of post-harvest products and in addition the Department FDA of the Ministry of Health (MoH) for food safety.
FAO mentions (page 12) the conditions, which have to be met for the lab to start operating:
- Procurement of necessary chemicals (budget and import licences needed).
- National standards for edible oil. The absence enhances risks in the quality of exports and prevents an effective overview of the quality of imports.

In October 2014, these conditions are not met and the laboratory still needs an official inauguration. According to the FAO, it was expected it would take two or three years for the lab to get an ISO 17025 accreditation (FAO, 2013b). For this accreditation extra trainings and support is needed, which is in the formulated by the FAO (page 12) as 'the laboratory needs highly specialized and well-trained staff and management'. During the period towards accreditation, the lab should perform quality control at domestic level and collaborate with research projects with renowned institutions or laboratories in the field of oil quality control. However, after the 'Oil Crops Development Project' ended in February 2013, NEOQCL has no means for trainings and supplies to start with the quality controls at domestic level and to work on accreditation.

Summarising, the factors that hinder a proper start for NEOQCL are:
- The lab has an isolated position, in the Myanmar Food Control System as well as in the Myanmar Edible Oil Crops sector.
- The position of the lab within the governmental organisation of food control is not logic. The lab is equipped for the analysis of edible oil, which is relevant for the MoC, in her responsibility for marketing and trade, and for the MoH in her responsibility for food safety, but not in the first place for the MoAI, which is responsible for the control of crops and seeds. In general, an overlap of competences exists within the government bodies, which FDA of the MoH acknowledges.
- The implementation of food safety laws is behind (see chapter 4) and national standards on edible oil are not available.
- Practical reasons: necessary trainings and supplies are lacking to start operating and working towards accreditation.

Currently the lab runs analysis for staff training only, but this is restricted to certain analysis, because of the lack of chemicals, solvents, columns and carrier gas. The NEOQCL manager considers the exporting or importing members of the Myanmar Edible Oil Dealers Association as their main customers in the future. In principle, the laboratory can analyse edible oil or oilseeds from every source that relates to production, imports, storage or retail: directly or indirectly through inspection teams of the Ministries involved in food control. Since NEOQCL has been built, several Japanese and domestic organisations -approached NEOQCL - under the assumption that the NEOQCL had been certified - to test their oil crop products. This indicates a certain need for a certified laboratory in Myanmar at this stage, which stakeholders from edible oil dealers and oilseed traders confirmed.

6.2 Laboratories for testing oilseeds or edible oils in Myanmar

In Myanmar, public and private laboratories are testing food safety and standards. These laboratories can be involved in testing of oilseeds and edible oils.

Public Laboratories
The Myanmar government has the following laboratories, which are involved in the testing of oilseeds and edible oils:

- Food Quality Control Laboratories of the Department Food and Drugs Administration (FDA) of the Ministry of Health (MoH), in Mandalay, Nay Pyi Taw and Yangon. They test edible oils and oilseeds for the consumer market and for products that need export or import licences (provided by the Ministry of Commerce (MoC)). According to our information, in Yangon they cannot do trace analysis (heavy metals), in Nay Pyi Taw they have no adequate instruments to test edible oils, in general the staff need training and their laboratories upgrading. None of them has an accreditation.
- Commodity Testing and Quality Management (CTQM), former Post-Harvest Technology Application Centre of Myanmar Produce Trading (MAPT) of the Ministry of Commerce, for testing and research relating to the different post-harvest activities with crops (logistics, threshing, drying, storage and processing). Goals are to improve the quantity and quality of the (food) products. According to our information they test oilseeds (no accreditation, so limited for export to countries that accept lower standards), have no adequate instruments to test edible oils on trace analysis and fatty acids and they need trainings. The lab management speaks of the necessity of 'upgrading of the laboratory'. The laboratory has been built with Japanese funding and expertise in 1985.
- Seed Laboratory (SL) and the NEOQCL of the Department of Agriculture (MoAI), both at the FAO compound in Yangon. The laboratory tests cereal crops, oil crops, pulses and vegetables and tests on moisture, purity and germination. They have no chromatography instruments or Atomic Absorption Spectroscopy (AAS) to test residues and other contaminants. This lab needs also upgrading. NEOQCL has everything in place to test oilseeds and edible oils, but needs supplies and trainings to be operational. Both labs have no accreditation.

All government laboratories rely for a large part on foreign donors for investments in equipment and NEOQCL also for supplies. NEOQCL has a budget for housing, salaries, utilities and standard office expenses, but not for laboratory operations; they still use the chemicals and materials that were procured during the Oil Crops Development Project. This observation on the financial position of NEOQCL corresponds with our visits to CTQM and the FDA laboratory in Nay Pyi Taw, which laboratories are not fully operational because of the lack of proper functioning instruments, supplies and trainings. This impression corresponds with the information provided by the Seed Laboratory, the laboratories of FDA in Yangon and Mandalay and relevant research. These observations are in line with the findings of Lin and Yamoa (2012, p685*):*'As insufficient capacity and infrastructure of the related organizations are the main hindrance in implementing food control works, these essential infrastructures clearly need to be upgraded in terms of number i.e. qualified staffs and laboratory equipment as well as in terms of quality i.e. technical assistance to be able to cover the scope of control measures'(Lin and Yamao, 2012).

The exception to the general picture is the 'Analytical Laboratory Section of Fish Inspection and Quality Control Division', the Fishery Lab of the Ministry of Livestock and Fisheries in Yangon. They managed to acquire the ISO 17025 accreditation in June 2013, after a serious and long preparation period (2009 - 2012). The accreditation was extended in June 2014 with several applications, especially for testing of residues in shrimp. The most striking feature of this process was the funding: the Department of Fisheries and the Myanmar Fishery Producers and Exporters Association carried all expenditures. To stay fully operational, the Fishery Lab has made the necessary arrangements with her department about the income of tests and the lab expenses. The value of a certified laboratory to EU standards is illustrated by the development of actual exports of fish and fishery products to the EU. Representatives of the Myanmar Fishery Producers and Exporters Association expressed their concern last year about the difficulties the sector has in meeting the EU quality and food safety requirements(Aye, 2013a): 'All aspects of the production line must be monitored - from the fishing

boats and fish farms to transport and factories'. The fishery sector of Myanmar is very keen on improving all these requirements and is supported by the EU. The EU will spend €14m until 2017 to help Myanmar fish exporters increasing their ability to access the EU market, which is commercially interesting for Myanmar since they received the Generalised scheme of preferences (GSP) status in June 2013 (Aye, 2013b). The task of the Fishery Lab is broader than performing tests. They are actively involved, together with their department, in supporting the fish farmers, fishers and fishery companies in the implementation of GHP, GMP and HACCP quality systems to be able to comply with EU requirements. It is this position and approach, which makes the position of the Fishery Laboratory extremely valuable.

Private laboratories

During our field visit, we could identify some private laboratories that are testing oil crop products. The list below is far from exhaustive and all have no accreditation.

- Food Industries Development Supporting Laboratory (FIDSL) of the Myanmar Food Processors & Exporters Association (MFPEA) in Yangon. This laboratory is built with Japanese aid (JICA) to support the Myanmar producers and exporters. They can test edible oils (basic composition and fatty acid profile), but cannot do trace analysis. They cooperate with FDA for export licences and in method development.
- OMIC Myanmar in Yangon. According to their website, they can analyse oilseeds and edible oils. However, for testing on aflatoxins, they need the FDA. Several Myanmar traders and processors use OMIC among others for their sesame export to Japan. Some traders use also laboratories in Thailand, if Myanmar laboratories are not competent.
- SGS Myanmar in Yangon has - as far as we know - no complete testing facilities for edible oil, but they can work with their labs in the region, which are better equipped.
- Some companies have their own laboratory to do some basic tests. In general, they rely also on other laboratories for testing.

All laboratories, except the FDA laboratory in Mandalay, are in Yangon, which is time consuming and costly for the companies in Mandalay and other regions for the testing of their products. None of the private laboratories has an accreditation and this corresponds with the overall situation in Myanmar, with a lack of qualified people, lack of financial resources, no national standards for food products and a slowly growing demand for tests of exporting and processing companies. We can expect that these laboratories will expand and improve their services along with the development of the market. For the commercial laboratories like SGS and OMIC this depends on the judgement of their mother companies about the Myanmar developments, for FIDSL this is also a matter of (limited) means and priorities of the associations involved. The laboratories of the government have a different position and more extended terms of reference: they are committed to their task in food safety, the support of the edible oil crops sector and the Myanmar interests related to international trade.

The observations above about the role of the Fishery Laboratory and the requirements besides testing facilities, like implementation of GHP, GMP and HACCP in the total value chain, will be similar to the requirements of the edible oil crops sector on the international market. If we focus on international trade, these requirement need to be improved to make exporting or importing companies, fully eligible on the international market, more competitive and have the means to improve food safety. In general, the export and import requirements are still too complicated for companies: lengthy procedure and it endangers the food quality. A recent analysis of rice export and palm oil import illustrates this very well (Ksoll *et al.*, 2013). It takes 19 to 23 days between the sales contract and the preparation of the shipping documents for the export of rice from Yangon to West Africa (no testing demand). It takes 23 to 26 days to import palm oil from Malaysia, from sales contract until final payment, of which the step 'examine, inspect, test, take sample and discharge cargo' takes 4 to 7 days. Their recommendation: abolish the present obligation for 'import recommendation' and 'import license' (total 9 days) and simplify all processes and procedures (Ksoll et al, 2013, p23 and 44). These facts and conclusions correspond with the complaints we have heard during our meetings with stakeholders of edible oil dealers. According to a representative of the Ministry of Commerce, this procedure has been limited from one or two weeks in the past to 1 to 3 days now. However, 'when testing is necessary, the FDA of the MoH is involved and this may take longer'.

Training and testing levels

Training and accreditation are related to the functioning of analytical laboratories in general. Analytical laboratories can be very sophisticated institutes, relying on complex and very expensive instruments. This requires well-trained people: they should be educated in chemistry, how to perform chemical analysis and how to use properly the instruments. People can be trained for general testing or for special tests. A test can be simple or very complex, because of the necessary sample preparation or because of the fact that the test consists of different tests (parameters).

There are several types of trainings, with or without other technical support:

- Trainings to learn how to operate specific instruments or combinations of instruments. We call this also 'basic trainings'.
- Trainings to perform a specific analysis (often called 'application' or 'method' and also basic trainings')
- Trainings or technical support to develop a specific analysis or a specific method. This can be/become a standard. The level of training varies between basic to highly specialised (proficiency) depending the specialisation.
- Trainings and technical support to introduce and implement a quality assurance system in a laboratory. Indicated also as higher-level training.
- Trainings and technical support for a combination of method development and quality assurance needed for 'accreditation'. Because there is more than one method, you can have accreditations for different methods. Proficient skilled staff is needed.

The world of analysis techniques, like chromatography, is specialised and relatively small. Yet - within this small word - there are many specialisations, which make it hard to have an overall overview. The scientific magazine *Journal of Chromatography B* of Elsevier illustrates this, a journal for a very small scientific sector. For decision makers, it often troublesome to take decision on investments in such highly specialised equipment and recognise the benefits. Decision makers have to rely on the information of their lab managers, researchers and on the suppliers of the instruments to take such decisions. Often this information does not offer a full overview of costs and benefits, especially when research or production control is involved.

Table 6.1

Testing levels, markets and examples of tests

Level testing	Market	Examples of tests (on)	Seeds/ cake	Oil
Informal (Personal experience)	Informal (mainly) local markets in own region based on trust and informal rules	Inspection	X	
		Admixture	X	
		Moisture	X	X
		Odour/smell	X	X
		Flavour/taste	X	X
		Colour	X	
Formal	Formal: domestic markets and neighbouring countries with low/little food safety standards, legislation and control	% oil	X	
		FFA acid value	X	
		Colour (lovibond)		X
		Aflatoxins	X	X
		Impurities		X
Medium	Countries or companies with food safety standards, legislation and control at least at the level of the Codex Alimentarius	Iodine value		X
		Peroxide value		X
		Saponification value		X
		Unsaponifiables		X
		Slip melting point		X
		Refractive index		X
		Anisidine value		X
		Mineral oil		X
Proficiency	Countries or companies with very well and highly developed food safety standards (including very strict private standards), legislation and control	MRL's (pesticides) or contaminations (dioxin, PAH*, PCB*)	X	X
		Bacteria, viruses	X	X
		Heavy metals		X
		Fatty acid profile		X

* PAH Poly Aromatic Hydrocarbons; PCB Poly Chlorinated Biphenyl

Above we presented the tests required on specific markets and the level of trainings to perform such tests. We include also the informal tests, visual and sensory testing based on personal experience, for which no equipment is used. As presented in the previous chapter, this is the largest market segment

in Myanmar at this moment. We expect that formal tests will be needed if the consumer consciousness on food safety will increase. At this moment, the demand for proficiency tests is required for exports of sesame seeds to e.g. Japan. This market segment is very small and in foreign hands. The growth in demand for such tests will depend on the success of the oilseeds and vegetal oil sector to export to high-end markets. In the short run this will be a low demand, in the future it might be an important market segment.

In the case of NEOQCL the trainings levels mentioned afore are all relevant, also the more basic trainings because of the lack of hands-on experience. To provide professional service for the oil industry and to perform other national tasks, the lab manager and her staff of NEOQCL see the following steps as necessary:

- Trainings of staff and management and availability of adequate, normally priced materials (chemicals, solvent, carrier gas and columns).
- Analyse samples regularly.
- Establish industry wide acceptance of analytical methods and protocols and their implementation, under internationally accepted quality management standards.
- ISO 17025 accreditation (final step).
- Next to these steps, we think that a sufficient number of contacts and orders for tests from the edible oil sector are needed.

6.3 Business opportunities for NEOQCL

6.3.1 Business as usual: troublesome prospects

Assessing a business plan for NEOQCL is complicated because its position depends fully on the decisions and ambitions of the government. Afore is mentioned that:

- The position of the lab within the governmental organisation of food control is not logic and an overlap of competences exists within the government bodies.
- Insufficient resources for necessary inputs (e.g. chemicals) are available for performing tests. A sound business approach in which costs and benefits are weighted seems not yet possible.
- In addition, the laboratory has also an isolated position in the Myanmar Edible Oil Crops sector.

Before a business plan can be drafted (and the need for training identified) crucial issues are:

1. Specification of the responsibilities of MoAI, MoH and MoC in the control activities related to the oil crop products. This specification is preferably done by or in cooperation with FDA, the coordinating authority within the government. In this respect it is important to realise that the former roles of MoI, MAPT of MoC and MAS of MoAI in trade and processing do not longer exist
2. Clarification of the position of NEOQCL towards its stakeholders (DoA, MEODA and other players in the Myanmar food control system) and towards other laboratories. This position can be cooperation with other laboratories within the government, a public-private partnership between government and oilseeds and edible oil sector, or otherwise.
3. Possibilities of acquiring financial means for the necessary supplies, investments, needed trainings and other expenses to run the laboratory. As an example, a reliable internet connection will help the staff of NEOQCL in learning, will save in accreditation, will save trainings costs, will enable to retrieve information on many applications and standards online and using best practices from all over the world.
4. A consistent plan for the ISO 17025 accreditation in line with the needs and development of the edible oil sector and get the necessary funding. The sector development will determine the timeframe.

NEOQCL is under the supervision of the Ministry of Agriculture; hence, it is the ministry's responsibility to define the tasks, mandate and position of NEOQCL. A key factor is: NEOQCL needs to be technically an independent organisation within a mandate of DoA. DoA has to allow NEOQCL to organise its financial and operational position in such a way, that it can play its role in the Myanmar food control system and in the Myanmar edible oil sector. If the position of NEOQCL does not change, the prospects for NEOQCL are troublesome. No means to perform their tasks and not embedded in the

sector resulting in not playing any role of significance in the oilseed and oil sector. The fishery laboratory of which the position, mandate and tasks are more clear, might serve as an example for the future opportunities of NEOQCL.
DoA has reasons to keep NEOQCL as a governmental laboratory. The Myanmar government wants to control food safety, just like many other countries. In the EU, the Netherlands, Belgium and Germany work with governmental laboratories, the UK and Sweden with private laboratories and Spain has a mixed model. Food safety laboratories, mandated by the government might be seen as essential. The investment in NEOQCL (amounting up to USD550,000) resulted in high quality (building, set-up, personnel) that is still present. A 'withdraw' strategy, an accepting the investments as sunk costs need also a strong motivation.

6.3.2 NEOQCL with a mandate: vital role in sector development

The business opportunities presented in this section are based on *a strong assumption: a clear mandate for NEOQCL with responsibilities and competences of the management that makes operating independently in a business environment possible.* The governance of the fishery laboratory can serve as starting point. If these requirements are not fulfilled, the prospects, as described above, will be the case.
The analysis of the opportunities of the Myanmar edible oil crops sector indicates that today Myanmar exports oilseeds and very little edible oil. The need for analysis of the sector concentrates on oilseeds, domestically produced edible oil and imported palm oil. As presented in the previous chapter exports of seeds and oil are attractive opportunities. However, these export market opportunities, even in the best case, will not be realised in a few years. Hence, the demands for testing at this moment are:
- Formal tests that will substitute actual informal quality assessment based on experiences in the current business activities. Several traders expressed their interest especially for testing facilities near their business activities and at affordable prices.
- A very small number of tests on seeds for exports. Now, the exporters use foreign laboratories.

In the future sophisticated tests might be needed:
- If the sector is successful in exporting seeds and oil to foreign markets that demand certified guarantees on food safety.
- If the food safety policies set higher standards and want to safeguard these, testing will be compulsory and enforced. In the short-term NEOQCL can be involved in the control of seeds, in the control of imported palm oil and for the control of domestically produced oil. These are tests on the basic composition and all parameters to specify the 'footprint', contaminants and possible adulteration of oil.

The SWOT analysis is introduced in section 5.1 and will also be followed in this section. Keep in mind that we assumed that the mandate of NEOQCL is secured as mentioned in the first sentence of this section. The most important internal factors for NEOQCL are:

Strengths:
1. High quality equipment in a professional set-up and environment.
2. Education and motivation of manager and staff.
3. Focus on the edible oil sector.

Weaknesses:
1. Isolated position in oilseed and edible oil sector: it has no commissioned work from the sector.
2. Not fully operational, not officially open.
3. Lack of experience.

The most important external factors for the NEOQCL are:

Opportunities:
1. The potential of the Myanmar oilseed and edible oil sector.
2. Cooperation with the Myanmar Edible Oil Dealers' Association (MEODA) and their related organisations.

3. Cooperation with other laboratories e.g. the Fishery laboratory (Similarities in the composition of vegetable oil and fish oil (fatty acids, saturated/unsaturated fats) and in trace analyses).
4. No mature market for laboratory tests and laboratories can only offer a limited level of tests.
5. CEXCs in cities that are key to the sector and important meeting points of stakeholders in the sector.

Threats:
1. Tests in the edible oilseeds and oil sector are mainly informal, maybe some basic tests. Hence, business has still to be developed and very little certified test will be needed. It takes, even in the most optimistic view, before the sector needs proficient tests and certification.
2. Sector needs laboratory in their vicinity. Yangon is one of the trade centre, but stakeholders in other regions stressed strongly the need for a lab near to their business.
3. High costs of development and exploitation of a chemical analytical laboratory.
4. Food quality system is poorly developed in Myanmar.

In the previous chapter, we presented two possible developments: export or domestic oriented. In the domestic oriented scenario, the demand for test will be low and the need for laboratories can be discussed. However, in the other scenario a laboratory for testing, developing standards aiming at improving the quality and safety of oilseed and edible oil is a Key Success Factor for the sector. National standards on edible oil will strengthen the position of the Myanmar edible oil sector in exports and imports. We suggest following the developments in the sector step-by-step, but always keeping a step ahead. A Key Success Factor for the NEOQCL is excellent working contact with actors in the value chain.

We propose the following:
1. In the short run the sector needs formal basic quality standards and basic tests at affordable prices done by an organisation that is easy accessible. A possibility is using the CEXCs as contact point for actors in the oilseed and edible oil sector and the NEOQCL. Provide services of quick and affordable tests and provide the results always on the CEXCs. The tests can be done at the spot, or NEOQCL arrange all logistics to Yangon, but this should not cost any efforts of the client. The main point is that NEOQCL establish an excellent cooperation with the private sector.
2. Form a group to monitor the production and trade in oil crop products and to test regularly in order to improve the quality of storage, processing, products and prices.
3. Support adequate labelling of edible oil and enabling collective branding. The information on the labels is in general not adequate: Myanmar has no law/regulation on labelling. However, the USDA mentions the Labelling Requirements as follows: 'Burma follows Codex guidelines and the ASEAN Common Principles and Requirements for the Labelling of Pre-packaged Foods. All foods must be labelled and imported products must have the labels in Burmese or a label in Burmese must be affixed with the name and address of the local importer and/or distributor and the country of origin.'(Vasquez *et al.*, 2012). This indicates a gap between policy and practice.
4. Enhance packaging and awareness. Many products sold on markets have no decent packaging. Education and awareness of consumers need more attention.
5. Participate in ASEAN initiatives in food safety and examine the possibility of using the ASEAN reference laboratories in the course to a specialised edible oil laboratory[2]. NEOQCL might become the reference laboratory in 'fatty acids' yet, that is not available in the ASEAN countries.
6. All laboratories need trainings, they can cooperate more in general and the support to the sector can be improved (specialisation, agreement on relevant parameters for edible oil analysis and on 'footprints' of edible oils, support to the edible oil crops chain). Four levels of Support to the Sector:
   a. Crops: GAP support, especially on use of fertilisers and choice of fertilisers and on the use of pesticides.
   b. Storage: GHP (conditions), pesticides.

[2] 'ASEA Common Principles for Food Control Systems', p9. http://www.asean.org/archive/21915.pdf.

c. Processing: HACCP (consults/advice and trainings), GHP, support in getting licences for production and export.
d. Trade (policy): standards (ASEAN, CODEX, Japan, EU), expertise about different regions and countries' demands (specifications, standards etc.).

The outcomes of the SWOT analysis lead to the following strategy for NEOQCL:
Cooperate with the edible oil crops sector, which is represented by the Myanmar Oil Dealers' Association, and use your professional set-up, your focus on the edible oil sector and the experience of the Fishery Laboratory.

At this moment the need for the training of the laboratory staff, could not be assessed. The position of NEOQCL needs clarity first as well as its potential business approach related to the actors in the sector. In Annex 6, a tentative draft of a business and trainings plan is provided.

7 Recommendations

7.1 Opportunities and market windows

Upgrading the oilseed and edible oil sector

To become a world market player at all levels of the supply chain -from seed breeders to exporters- a boost is needed: a higher, more efficient and market oriented production. As mentioned before the gain can be over USD1bn of foreign currency earnings. First, the private sector has to recognise the market opportunities and to invest in the development of their firms. Investments are needed on all level from quality seeds and inputs at farm level to food safe handling and packaging at exporter level. Second, the sector has to cooperate with all levels in the value chain: tracking and tracing is necessary and the quality at the first level is key and is hardly to improve in the next levels of the value chain. The developments are depicted in Figure 7.1. Enhancing the capabilities of the stakeholders is necessary by training. Furthermore, the enabling environment needs to develop at an even quicker pace: enhancing doing business at an international level, enforced quality standards and control, infrastructure and credit facilities. We recommend studying the feasibility of a sector development more in depth. Section 7.4 suggests the possibilities for international support.

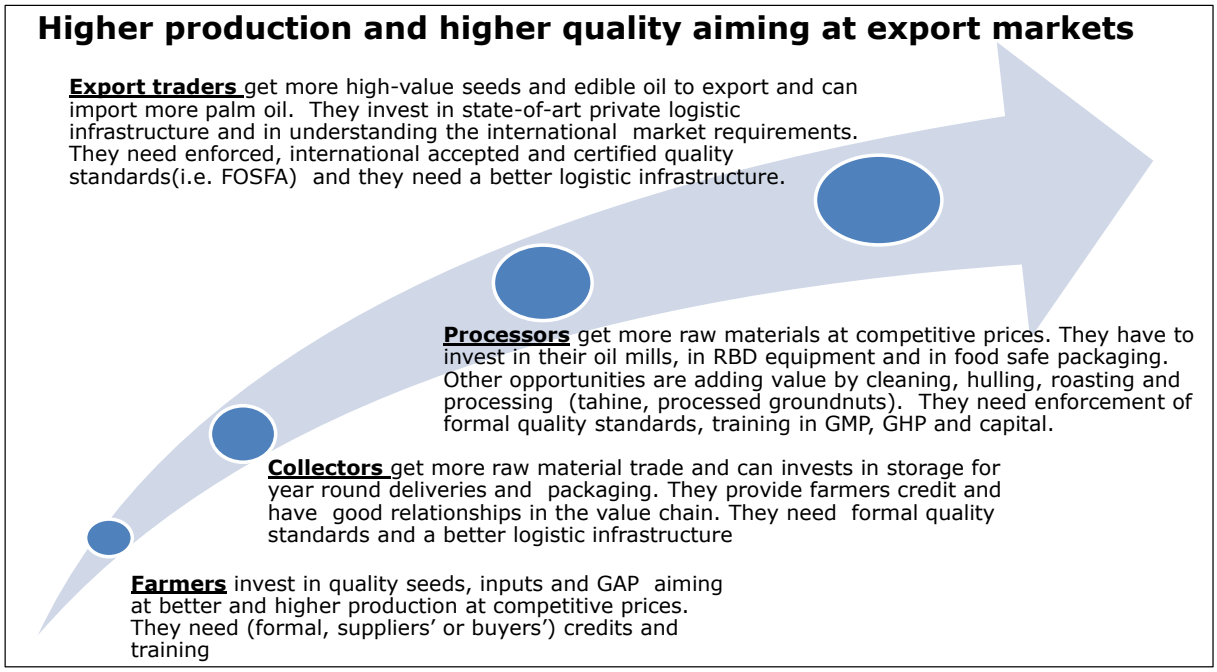


Figure 7.1 *Upgrading the oilseed and edible oil sector.*

Export market windows

The Myanmar edible oilseed sector is recommended to focus on exploring the export opportunities of two market windows (based on Figure 5.1 and findings in Section 5):

1. China. It is a large nearby market with substantial imports and on which the quality standards are still moderate. This market can be used to gain experience and become familiar with exporting.
2. EU. The EU has an import portfolio that includes almost all products from the Myanmar oilseed sector. This region pays a substantial premium price. By focussing on this market, compliance and

spill-over effects can be achieved. For buyer requirements on the EU market it is recommended to start the orientation with studying the brochure of CBI 'EU Buyer requirements for vegetable oils and oilseeds'[3] (CBI, 2014). That brochure presents the links to the European Food Law, regulation regarding food safety, traceability, hygiene and control, the labelling directive and so on. This can be helpful in implementing an own food safety control and in understanding the requirements for exports to the EU.

These two focal points above do not exclude others export destinations. Several other market niches provide opportunities: each enterprise has to identify their markets and to act accordingly to achieve a position on that market. Japan is one of such markets that pay high prices. However, in section 3.6 is demonstrated that the high prices induces high costs for complying with the Japanese quality standards. At the end, the farmers receive lower margins compared to export to China.
This export orientation is even more necessary as we expect that substitution of imported oil by domestic production is almost impossible. Focussing on domestic demand will end in a declining oilseed and vegetable oil sector. Ambitions of value adding, self-sufficiency and strengthening of profitable and sustainable market for farmers will not be achieved. Hence, the domestic market is not seen as an attractive market window for sesame and groundnut oil.

7.2 Strengthening the food control system

The functioning of the food control system was subject of Chapter 4. The question addressed in this section is: How can the food control system be strengthened?

A first consideration concerning the role of international donors and organisations is to respect ownership of the problems by the governments of developing countries. In the case of the Myanmar Food Control System, it is the deputy Director General of the Department of Agriculture within the Ministry of Agriculture and Irrigation who asked FAO to support his Ministry in working out a business plan of the NEOQCL. A second consideration is the perception, broadly accepted within the international development community, that the role of international donors and organisations should be to facilitate national champions of developing countries. In other words, the champions of developing countries have the lead and the role of international donors and organisations is limited to expertise and financial support.

The Myanmar government can exploit its involvement with international donors, like the EU, USAID, Japan International Cooperation Agency (JICA) and the Livelihoods and Food Security Trust Fund (LIFT) and international organisations like FAO, ASEAN and the Codex Alimentarius. The EU has specific programmes on food safety for developing countries. USAID has developed a Strategy on Food Security, of which food safety is an important component. JICA has funded the building of the Food Industries Development Supporting Laboratory (FIDSL) of the Myanmar Food Processors and Exporters Association (MFPEA). LIFT is a multi-donor fund established in Myanmar in 2009. The goal of the LIFT Strategy is to contribute to reduce sustainably the number of people in Myanmar living in poverty and hunger. It is driven by the conviction that pooling donor resources enables programme coherence and leads to greater impact. It is expected that LIFT will continue until the end of 2018. In addition to build and equip the NEOQCL, FAO has undertaken a broad range of activities to strengthen the edible oils sector of Myanmar. ASEAN is the regional organisation, relevant for Myanmar concerning standards, reference laboratories and consumer protection. There is cooperation between this association and other Asian countries like China and Japan but also with non-Asian countries as Australia and New Zealand. The Codex Alimentarius Commission is the programme of FAO and WHO on food safety standards. The FDA is the Codex contact point, Myanmar has a National Codex Commission and Myanmar participates in meetings of Codex Committees.
A strong involvement of Myanmar with international donors and international organisations could strengthen the capacity of the NEOQCL of Myanmar. More specifically, experience with risk

[3] Downloable from: http://www.cbi.eu/marketintel_platform/vegetable-oils-and-oilseeds/136060/buyerrequirements

assessment is available in The Netherlands (RIKILT, the Dutch Institute of Food Safety), the European Union (European Commission) and Japan (JICA). The technical expertise of FAO, the knowledge of the Codex Alimentarius on risk management and the commercial opportunities of ASEAN are as relevant. Some specific possibilities for cooperation are:

1. The European Commission programme 'Better Training for Safer Food'. The objective is to inform exporting countries about guarantees they must provide as to the respect of EU rules with regard to food safety.
2. A programme of the Codex Coordinating Committee on Asia to strengthen the coordination within ministries, between ministries and with stakeholders on food safety, funded by JICA.
3. FAO training on setting up Public Private Partnerships.

7.3 Proficient food safety and quality testing laboratory

The Myanmar edible oil sector needs adequate and cost-effective laboratories to control its production processes and products. At present, the capacity of the operating laboratories of the government is insufficient: there is a lack of functioning instruments, of trained people, of supplies and of accreditation. The commercial laboratories are relatively expensive, especially if they would be used for regular monitoring. Furthermore, they see no commercial need for accreditation yet. The sector needs more than only a provider of tests for imports and exports. They need also support in monitoring their products to improve the quality of production and products. They need a certified laboratory for export of oilseeds and edible oil to high-end markets like the EU. The government can anticipate the export opportunities of the oil crop sector by establishing a certified laboratory. The recent history of the Fishery laboratory shows the possible role of a professionally equipped, certified laboratory to support the sector.

The position and operational possibilities of NEOQCL have to be reconsidered as soon as possible. Ideally, the ministries, which are involved in the control and quality of oil crop products, have to reconsider the present roles of their involved laboratories and have to decide which role NEOQCL can play. A first step will be to clarify the position of NEOQCL towards its stakeholders and to enable the laboratory to start operating. Accreditation of the 'edible oil laboratory' will be a logical and an inevitable next step, if the opportunities on the world market of the edible oil and oilseed sector are to be grasped.

A public-private partnership with the involved governments, the laboratories, science sector and the edible oil and oilseeds sector can be a solution to discuss and to plan future actions. The presented business plan (Annex 6) shows the strategy and the conditions for a certified laboratory as NEOQCL. In the short run the sector needs formal basic quality standards and basic tests at affordable prices done by an organisation that is easy accessible. Below 'A step by step', approach is recommended.

7.4 Foreign support and foreign direct investment

Supporting and cooperation with the Dutch Community

The ambition of the MoAI to restructure the agricultural support system to increase productivity and value-adding opportunities along the entire supply cannot be stressed enough. However, the resources in Myanmar are limited. We recommend to Dutch government to support (e.g. in the framework of FDOV[4]) two selected but intertwined cases in Myanmar: one value chain focussing on export of high value seeds complying with the EU quality standard and one value chain restructuring the oil millers sector aiming at export of oil specialties to EU. In both cases, the Netherlands can be the trade hub for products from Myanmar. To increase the possible success, cooperation between the Dutch and Myanmar private sector should be established. Companies in both countries should benefit from such

[4] For information see: http://english.rvo.nl/subsidies-programmes/facility-sustainable-entrepreneurship-and-food-security-fdov

cooperation. It will be clear that the private enterprises as well as the public sector need to contribute to such investments.

Table 7.1
Imports by the EU and the Netherland of oilseeds and edible oil (average 2011 -2013).

		EU-imports		Netherlands imports	
		in% world	in% world	in% EU	Million USD
Seeds	Soya beans	14.9	3.2	21.2	1,711
	Groundnuts	51.0	19.8	38.9	521
	Linseed	64.0	4.6	7.2	38
	Rape	53.9	9.6	17.8	1,183
	Sunflower	62.5	10.5	16.8	381
	Other (including sesame)	23.4	2.9	12.2	110
Oils	Soya-bean	15.7	1.4	8.8	135
	Groundnuts	49.1	3.3	6.7	13
	Olive	56.6	1.2	2.2	73
	Other oils and fraction	60.9	1.4	2.2	3
	Palm	23.3	6.7	28.9	2,386
	Sunflower	41.8	7.2	17.3	674
	Coconut (copra), palm kernel	33.4	10.0	29.9	647
	Rape	44.0	9.6	21.9	764
	Other fixed vegetable fats	41.8	6.4	15.4	239

Why should the Dutch invest in the oilseed sector in Myanmar? The Netherlands is an important import hub for oilseeds and edible oils: the total imports of oilseeds and edible amounts almost USD9bn. Furthermore, the Dutch is the major logistic hub for the EU imports for several products: a share in the EU imports above 10 or even 20%. In addition, now some contacts between Myanmar and Dutch importers are already established. Investing in the trade connections contributes to the ambition of being leading in logistics and hub and strengthens the Dutch edible oil sector.

Interested foreign investors in Myanmar are recommended to study the reports of PWC and OECD for the investment possibilities, tax exemptions and investment guarantees. The OECD report 'Investment Policy Reviews. Myanmar' is a voluminous work, that presents and analyses all policies in Myanmar (OECD, 2014). The 'Myanmar Business Guide' of PwC is more practical and describes the requirements and benefits for foreign investors in Myanmar (PWC, 2014).

'Step-by-Step' approach: a first step
The aim of this recommendation is enhancing (export) quality competencies of the Myanmar oilseed sector. We recommend starting a pilot project for cooperation between on the one hand the oilseed and edible oil sector and on the other hand the laboratory NEOQCL. More specifically, the objectives are:

1. Establishing a (strong) working relation between the sector in the main production and processing regions and NEOCQL.
2. Enhancing the quality consciousness of the sector.
3. Enabling the laboratory using their equipment in favour of the sector.
4. Enhancing export competences of the sector.

To that end, we propose:

1. The laboratory offers around 1.000 tests at a reduction of e.g. 50% to actors to be executed within 6 months. (NEOQCL has an annual capacity of 5000 tests) That reduction is possible because now the laboratory equipment and staff is idle.
2. Accessibility of the laboratory outside Yangon is important, therefore at least one (preferable more) region(s) should be in another part of the country. We suggest the Mandalay region, as the oil processors were very open and interested in quality improvement. Daily contact between the processors and laboratory staff needs to be established, contact places (=office and maybe simple testing facilities) can be on the CECXs in such places.
3. The Dutch government provides sufficient means for buying chemicals needed for doing tests. The NEOQCL should collaborate with and exploit the experience of the Fishery laboratory, in the

procurement of these chemicals. In addition, some other out-of pocket costs of NEOCQL will be compensated (e.g. travel expenses and costs of offices at the CEXC)

4. As exporting is in the future necessary, we suggest in addition, that a fair amount of seeds or oil (a few 1,000 tonnes) is exported to the EU (the Netherlands). Those who aim at exporting gets support in finding Dutch importers. Costs for matchmaking need to be covered in the project-plan, executing the trade is on cost of the Myanmar exporter and the Dutch trader.
5. The project plan should be developed by the (e.g. National, Mandalay) Associations in cooperation with NEOQCL.

Based on this new experience the laboratory must be able to get a clear mandate from the government (like the Fishery laboratory) and it should be able to specify clearly the support needed to being operational for supporting the sector and enhancing export prospects.

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- National Nutrient Database for Standard Reference: http://ndb.nal.usda.gov/ndb/search/list

Annex 1 Programme and contacts of the fact-finding mission in 2014

Date	Organisation/persons	Topic/activities
Sa 27/09	Netherlands Economic Mission Yangon.	Briefing on mission. Briefing on sector.
Su 28/09	City Market, Down Town, Yangon.	Exploring consumer market.
Mo 29/09	Myanmar Edible Oil Dealers' Association (UMFCCI), Yangon. Around 10 members and in addition staff members.	Presenting findings desk research. Discussing developments in oilseed sector, trade and food safety.
	Maou Oak Shaung International co. Ltd, Yangon	Exporter of pulses and oilseeds among others to Japan and the Netherlands. Discussing trade and export activities and experiences.
	East-West seed International Limited, Yangon	Actual situation and developments of primary producers. Bottlenecks and opportunities.
Tu 01/10	Food and Drugs Administration (FDA) of Ministry of Health in Nay Pyi Taw. Directors of department and laboratory.	Discussing developments food safety, control, testing and laboratories in the oilseed sector.
	Edible oil processors in Mandalay Mingalar Than Oil Processor and shop, Small scale, ground nuts + shop Wooden Fish Oil Processor, Large scale groundnuts YEU, Trading and cooking oil mill. Large scale: Soya beans, trader in oil cakes Duwan Oil mill, Medium scale Niger seed, groundnuts and red sesame Golden Taste oil mill and shop Large scale, Sesame seed, groundnuts + shop Naythurein oil mill and shop, Small scale Sesame seed, groundnuts + shop	Actual situation, bottlenecks and opportunities of oil processors.
We 01/10	Mandalay Region Edible Oil Dealers' Association. Above 30 attendants	Presenting findings desk research. Discussing developments in oilseed sector, trade and food safety
	20-30 members of the association, Mandalay	Informal exchange of ideas on sector developments during lunch
	Edible oil processors in Mandalay (continuation) The Asian oil mill , Small scale, Groundnuts and shop (including other dry groceries). Thamadi oil, Groundnuts and shop.	Actual situation, bottlenecks and opportunities of oil processors.
	Ministry of Agriculture and Irrigation, Department of Agriculture. Deputy Director General in Nay Pyi Taw.	Discussing developments food safety, control, testing and laboratories in the oilseed sector.
	Ministry of Commerce, Department of Commerce &Consumer. Deputy Director General and 4 other staff members in Nay Pyi Taw.	Discussing developments food safety, control, testing and laboratories in the oilseed sector.
Th02/10	Workshop 'The role of the (NEOQCL) in the Myanmar Food Control System' in Yangon. Attended by representatives (or lab managers) of MoAI, MoH (FDA), MoC and MoL&F and of the private sector edible oil (crops) sector and food technology.	Identifying needs, SWOT of food safety control
	First Top (Group),Yangon. Conglomerate of firms in oilseeds and edible and farming and several others activities	Actual situation, bottlenecks and opportunities of oil processors, oilseed producer and importer/exporter
	Diamond Dragon Industry, Yangon. Oil tanks, farming and trading	Actual situation, bottlenecks and opportunities of edible oil sector.
Fr 03/10	Network event and stakeholders briefing organised by National Economic Mission Yangon and attended by around 25 stakeholders, local television and journalists	Edible Oil Sector briefing and network event. Presentation and discussing first findings

Annex 2 Detailed information on production and food supply balances

Annex 2.1

Myanmar production and import of vegetal oil in 1,000 tonnes.

Production	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Cottonseed	15	13	15	20	17	18	18	19	25	39	53
Groundnut	109	114	123	132	137	118	167	195	222	237	244
Rape and Mustard	7	8	10	12	10	12	14	16	21	21	14
Ricebran	66	65	77	80	96	89	85	90	91	90	25
Sesameseed	140	154	182	197	183	252	286	313	318	322	324
Soyabean	15	17	17	21	24	27	29	31	36	38	35
Sunflower	92	96	92	116	129	192	169	241	271	276	171
Import											
Import palm	207	170	243	279	315	356	377	375	339	376	398
Import Other vegetal	67	61	36	22	43	21	32	45	31	23	11
Total Production + import	718	698	795	879	954	1085	1177	1325	1354	1422	1275

Source: FAOstat Food Balances Sheets

Annex 2.2

Myanmar sesame seed and oil balances in 1,000 tonnes

Seeds	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Domestic supply	363	395	459	500	473	665	719	730	789	814	865
Export	13	4	42	42	30	25	61	110	64	54	37
Food	38	40	50	54	50	69	78	84	85	87	63
Processing	312	342	398	434	413	586	630	634	692	715	789
Production	376	399	501	542	504	690	781	840	853	868	901
Seed	13	13	11	11	10	11	11	12	12	12	13
Oil											
Domestic supply	140	153	181	196	183	251	286	312	318	322	324
Export Quantity	1	1	1	1	1	1	0	1	0	0	0
Food	60	73	78	81	81	83	87	92	98	72	64
Other uses	80	80	103	115	102	168	199	220	220	250	260
Production	140	154	182	197	183	252	286	313	318	322	324

Source: FAOstat

Annex 2.3

Myanmar ground nuts, oil and cake balances in 1,000 tonnes.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Groundnuts (in Shell Eq)											
Production	731	757	878	946	1039	1024	1088	1202	1305	1362	1400
Export	1	0	1	1	1	3	2	2	2	0	1
Food	95	97	109	118	130	126	133	149	163	171	177
Other uses	184	180	216	237	289	329	186	180	172	165	172
Processing	354	370	399	428	446	384	568	664	753	805	829
Seed	75	87	110	115	123	127	137	142	147	147	149
Waste	22	23	44	47	52	55	61	65	68	74	73
Groundnut Oil											
Production	109	114	123	132	137	118	167	195	222	237	244
Food	109	114	123	132	137	118	167	195	222	237	244
Groundnut Cake											
Production	136	142	154	165	172	148	227	265	301	321	331
Export	4	4	4	4	3	3	3	3	3	3	3
Feed	133	139	150	161	169	145	224	262	298	319	328

Source: FAOstat

Annex 2.4

World imports of edible oil and prices (average 2011-2013).

Imports in 1,000 tonnes (average 2011-2013)

	China	Japan	India	Thailand	USA	EU	World
Oils							
Palm crude	87	14	5,653	30	31	5,095	15,614
Palm refined	5,990	571	1,686	17	1,120	2,759	19,622
Cotton crude						2	10
Cotton refined		3			5	3	80
Soya crude	1,374	18	1,047		12	879	7,294
Soya refined	1	10			61	352	1,256
Sunflower crude	201	25	957		51	1,824	5,034
Sunflower refined	4	5		17	32	971	1,709
Rape crude (low erucic)	1,053	15	37		427	1,655	3,804
Rape refined (low erucic)	31	7			953	807	1,974
Rape crude (other)		3	20		21	75	121
Rape refined (other)					3	152	211
Groundnut crude	61				13	70	156
Groundnut refined						24	39
Sesame	2	2	1		13	10	48
Seeds							
Groundnuts	32	28		63	19	753	1,764
Groundnuts prepared	2	59		2	46	182	478
Sesame	409	155	29	9	36	142	1,246

Import prices USD/tonne (average 2011-2013)

	China	Japan	India	Thailand	USA	EU	World
Oils							
Palm crude	882	1,089	981	1,289	911	1,004	948
Palm refined	991	1,092	981	1,013	1,049	1,143	1,044
Cotton crude						1,686	1,057
Cotton refined		1,326			1,037	1,743	1,269
Soya crude	1,180	1,547	1,203		1,081	1,210	1,129
Soya refined	2,191	1,562			1,266	1,366	1,236
Sunflower crude	1,216	1,727	1,229		1,560	1,335	1,320
Sunflower refined	1,943	1,932		1,545	1,909	1,500	1,463
Rape crude (low erucic)	1,254	1,340	1,244		1,226	1,246	1,250
Rape refined (low erucic)	1,343	1,720			1,289	1,342	1,335
Rape crude (other)		2,064	833		1,504	1,467	1,463
Rape refined (other)					2,360	1,519	1,540
Groundnut crude	1,945				1,716	1,947	1,944
Groundnut refined						2,334	2,280
Sesame	2,453	3,230	1,744		5,047	4,483	3,872
Seeds							
Groundnuts	1,102	2,156		870	2,210	1,782	1,489
Groundnuts prepared	4,263	2,541		2,531	2,727	3,033	2,687
Sesame	1,479	1,632	1,565	823	2,209	1,892	1,811

Source: Based on UNcomtrade

Annex 3 Area of oilseed crops (acres) at state or region level in 2010

State/Region	Groundnut	sunflower	Mustard	Sesame	Other	Total
Myanmar	1,823,003	510,656	72,130	3,837,255	88,470	6,331,514
Kachin	21,663	500	48,789	12,837	5,083	88,872
Kayah	2,397	536		11,182		14,115
Kayin	7,857	399		270		8,526
Chin	3,605	155	708	2,593	1,455	8,516
Sagaing	705,193	164,109	14,594	1,066,601	36,767	1,987,264
Taninthary	4			3		7
Bago East	30,742	21,701		24,805	8	77,256
Bago West	73,137	525		72,849	30	146,541
Magway	477,971	57,275	34	1,645,147	2,956	2,183,383
Mandalay	367,582	63,978	1,204	969,134	2,933	1,404,831
Mon	7,364	349		618		8,331
Rakhine	21,892	31	4,591	14	1	26,529
Yangon	3,369	482	9	15		3,875
Shan South	12,777	2,428	1,546	9,431	20,068	46,250
Shan North	23,105	759	648	9,176	19,040	52,728
Shan East	1,049			2,650	44	3,743
Ayeyarwady	63,305	197,436	5	9,929	85	270,760

Source:(MoAI, 2013)

Annex 4 Doing business indicators 2014

		Myanmar	China	Ethiopia	India	Nepal	Nigeria	Sudan	Tanzania
Overall	Ease of Doing Business rank	182	96	125	134	105	147	149	145
Starting a Business	Rank*	189	158	166	179	97	122	131	119
	Procedures (number)	11	13	9	12	7	8	10	9
	Time (days)	72	33	15	27	17	28	36	26
	Cost (% of income per capita)	177	2	100	47	35	58	21	27.7
	Paid-in Min. Capital (% of income per capita)	7016	78	184	124	0	0	0	0
Dealing with Construction Permits	Rank	150	185	55	182	105	151	167	177
	Procedures (number)	16	25	9	35	13	18	16	19
	Time (days)	159	270	128	168	115	116	270	206
	Cost (% of income per capita)	567	345	204	2640	513	3505	249	490
Getting Electricity	Rank	126	119	91	111	98	185	113	102
	Procedures (number)	5	5	4	7	5	8	5	4
	Time (days)	91	145	95	67	70	260	70	109
	Cost (% of income per capita)	3176	499	1880	231	1381	961	3435	1691
Registering Property	Rank	154	48	113	92	24	185	41	146
	Procedures (number)	6	4	10	5	3	13	6	8
	Time (days)	113	29	41	44	5	77	9	68
	Cost (% of property value)	7	4	2	7	5	21	3	4.5
Getting Credit	Rank	170	73	109	28	55	13	170	130
	Strength of legal rights index (0-10)	4	5	4	8	8	9	4	7
	Depth of credit information index (0-6)	0	5	4	5	3	5	0	0
	Public registry coverage (% of adults)	0	30	0	0	0	0	0	0
	Private bureau coverage (% of adults)	0	0	0	20	1	5	0	0
Protecting Investors	Rank	182	98	157	34	80	68	157	98
	Extent of disclosure index (0-10)	3	10	3	7	6	5	0	3
	Extent of director liability index (0-10)	0	1	4	4	1	7	6	4
	Ease of shareholder suits index (0-10)	4	4	3	8	9	5	4	8
	Strength of investor protection index (0-10)	2	5	3	6	5	6	3	5
Paying Taxes	Rank	107	120	109	158	126	170	108	141
	Payments (number per year)	31	7	30	33	34	47	42	48
	Time (hours per year)	155	318	306	243	326	956	180	176
	Profit tax (%)	27	6	26	24	17	22	14	20.4
	Labor tax and contributions (%)	0	50	4	21	11	11	19	18
	Other taxes (%)	22	8	3	18	3	1	3	6.4
	Total tax rate (% profit)	49	64	33	63	32	34	36	44.9
Trading Across Borders	Rank	113	74	166	132	177	158	155	139
	Documents to export (number)	9	8	7	9	11	9	7	7
	Time to export (days)	25	21	44	16	42	22	32	18
	Cost to export (USD per container)	670	620	2180	1170	2295	1380	2050	1090
	Documents to import (number)	9	5	10	11	11	13	7	11
	Time to import (days)	27	24	44	20	39	33	46	31
	Cost to import (USD per container)	660	615	2760	1250	2400	1695	2900	1615

		Myanmar	Chi-na	Ethiopia	India	Ne-pal	Nige-ria	Su-dan	Tanzania
Enforcing Contracts	Rank	188	19	44	186	139	136	154	42
	Time (days)	1160	406	530	1420	910	447	810	515
	Cost (% of claim)	52	11	15	40	27	92	20	14.3
	Procedures (number)	45	37	38	46	39	40	53	38
Resolving Insolvency	Rank	155	78	75	121	125	107	89	134
	Time (years)	5	2	2	4	5	2	2	3
	Cost (% of estate)	18	22	15	9	9	22	20	22
	Outcome (0 as piecemeal sale and 1 as going concern)	0	0	0	0	0	0	0	0
	Recovery rate (cents on the dollar)	15	36	37	26	25	28	33	21.4

* Rank 1 = best, 189 = poorest

Source: http://www.doingbusiness.org/data

Annex 5 Imports and growth of market share, Z-scores method

Import quantity (tonnes average 2011-2013) and change in world market share.

	China	India	EU-28	USA	Japan
Sesame seed Q	408.68	28.90	140.66	35.52	154.83
Sesame seed S	0.29	0.02	-0.06	-0.04	-0.10
Sesame oil Q	2.23	1.38	9.93	12.84	2.26
Sesame oil S	0.03	0.03	0.00	-0.01	-0.01
Groundnut raw Q	32.40	0.52	752.48	18.56	27.94
Groundnut raw S	0.03	0.00	0.00	-0.01	-0.02
Groundnut snacks Q	2.44	0.15	182.00	46.41	58.74
Groundnut snacks S	0.00	0.00	-0.07	-0.10	-0.21
Groundnut oil Q	61.82	0.03	94.38	14.29	513.00
Groundnut oil S	0.52	0.00	0.00	0.01	0.93
Total Q	507.58	30.99	1179.46	127.62	756.77
Total S	0.16	0.01	-0.10	-0.02	-0.22

Q=1,000 tonnes import 'average 2011-2013';

S= difference in share world imports 'average 2001- 2003' minus share 'average 2011-2013'. For example; China had in 2001-2003 an import share in sesame seeds of 0.04 and in 2011-2013 a share of 0.33 (=33% of all imports). The difference is 0.33minus 0.04 is 0.29.

Z-Scores: Comparison of indicators

The abovementioned indicators have different scales. To compare the different scales the values will be standardised. Calculations are:

X_i is observation i=1,n (i.c. number of countries)

$$\overline{X} = \sum X_i \Big/ n$$

$$s = \sqrt{\frac{\sum (X_i - \overline{X})^2}{n}}$$

$$z_i = \frac{X_i - \overline{X}}{s}$$

All variables will become the same dimension (average and standard deviation) and can then easily be presented in one figure. However, this method also has a disadvantage. The standard scores depend on the number of the countries and the levels of indicators in the sample: the standard scores are not fixed. It is in fact a benchmark, and if the benchmark countries or the level of one indicator in one country changes, the position of the countries will also change. It is a relative position.

Annex 6 Costs, investments and returns of NEOQCL

NEOQCL manager Dr. Khin Moe Kyaw provided a very detailed overview of data of the operational costs of 18 test parameters and of the possible fees of customers for testing these parameters. We have also an overview of the investments in instruments in 2011/2012 and the yearly costs of housing, utilities and office expenses. She collected also detailed information about the fees of the tests per parameter of comparable laboratories[5]. She estimates that NEOQCL has the capacity to perform about 5,000 tests per year, which is comparable to the number the Fishery Laboratory performs at the moment (5,400 tests per year). On the basis of this information we cannot judge the commercial viability of NEOQCL yet, see below for suggestions for a better estimation. In the scheme below an estimation of expenses is made, on the basis of the available data and a two stadia approach (phase 1 and phase 2 - 4). The length of the period can vary with the demand of the sector. The Fishery Laboratory is also in this sense a good example: they have tuned their accreditation priorities (order of certified methods) to the development of the needs of the fishery sector.[6] If NEOQCL or any other certifying laboratory has to support the edible oil sector, it has to act according to the developments and needs of the sector.

Estimation of yearly expenses and investments NEOQCL during 2015, 2016 and 2017 (in USD)

	Housing Utilities Office costs Logistics	Depreciation Equipment (reservation)	Laboratory supplies[7]	Training to start testing[8]	Total expenses	Investment in accreditation
*Phase 1**	35,500	55,000	9,500	40,000	140,000	
Phases 2-4[+]						
2015	35,500	55,000	20,000		110,500	105,000
2016	35,500	55,000	20,000		110,500	36,000
2017	35,500	55,000	20,000		110,500	80,500
Total						221,500

* Operational without accreditation

[+] In phases 2 - 4 NEOQCL is operational and is working on accreditation

Detailed data about the total demand for tests on oilseed and edible oil for the coming years are not available. These data depend on the number of companies, the number of international transactions, the development of the market and the actual regulation and inspection measures of the Myanmar government. We know the present number of traders and processors: four large exporters and more than 4,000 of medium and small traders and oil mills (almost 3,000 members of the association in Yangon and almost 1,200 in Mandalay (see Table 3.4). This customer base must be shared with private labs (OMIC, SGS, FIDSL). Customers in Mandalay need adequate laboratories in their region or a very efficient and fast expedition system of samples to the Yangon based laboratories. MEODA and the Mandalay Region Edible Oils' Association can investigate the number, the kind of tests (the involved parameters) and the certification demand of the related export orders among their members. With the available estimations of coasts per parameter, this exercise can give a good estimation of the total demand for tests and the possible net income of NEOQCL. If the need for tests or other services

5 FIDSL, Fishery Laboratory (FIQCL, ISO 17025 certified) and Food Quality Assurance Centre (FQASC, ISO 17025 certified) in Thailand

6 The shrimp sector suffered great quality problems the last decade and was not allowed to export. The Fishery lab and their department chose therefor to give accreditation for analysis of fish priority, their accreditation was only expanded in June 2014 for the testing of shrimp

7 Directly related to the number of tests that will be done by NEOQCL, this is an estimated minimum on the basis of a recent quotation of a Myanmar subsidiary of a well-known American lab instruments company. When the number of tests rises, the expenses for supplies will rise considerably. These data are all collected by NEOQCL.

8 Based on quotation Rikilt of February 2013 (not valid anymore) and estimated costs for travel and stay.

of a certified laboratory is urgent, the planning of the accreditation can be shortened. According to Dr. Khin Moe Kyaw, the accreditation can be done in 1,5 year. Question is, what time will be available then for normal testing.

Presently Myanmar has not a mature commercial market for laboratory tests for oil crop products with enough suppliers and corresponding competition. In addition, the existing commercial laboratories can offer a limited number of tests. In the Table below we see an impression of the prices of various parameters of one commercial laboratory and two government laboratories, compared to the estimated cost price of NEOQCL, exclusive overhead and depreciation costs. NEOQCL can make a certain gross margin, given the parameter prices of FIDSL and the Fishery Laboratory. NEOQCL is in general more expensive than the 'Food Quality Assurance Center' (FQASC) in Thailand, which has an ISO 17025 certification, but its prices do not include costs for extra banking and insurance charges and freight and (CIF). More data are necessary, to be able to set prices for NEOQCL. These prices must be related to certification and to the complexity and number of parameters of tests. In our contacts with traders and oil dealers high prices for tests were mentioned, but we cannot compare them with these individual parameters.

NEOQCL costs per parameter compared to prices charged by other laboratories (in MMK)

	Peroxide Value (primary oxidation)	**Oil colour test**	**Chlorophyll content**	Beta Carotene, **(vitamin A fortification)**	Heavy metals (Cu, Ni, Cd or Pb)
Variable costs NEOQCL	23,500	3,560	20,000	20,000	25,000
FIDSL of MFPEA	27,600				
Fishery Laboratory					30,000
FQASC (Thailand),(no CIF)	17,500	21,000	14,000	14,000	24,500

On the basis of this comparison, NEOQCL has to do many tests on the price level of its competitors, to be able to be break-even. On the basis of these (limited) data they need to test more than 19,000 parameters per year to be able to cover the overhead and depreciation costs[9]. If the average test contains four parameters, this corresponds with the number of 5,000 tests per year lab manager of NEOQCL has estimated. These calculations can be made again if MEODA investigates the number of tests, the kind of tests (the involved parameters) and the certification demand, as mentioned above. Like the role of the Fishery Laboratory and the original objectives of NEOQCL, the tasks of NEOQCL can be much broader than testing for exports only. There is a need for support to the edible oil sector in general (see footnote 25) and for support to other government institutes (i.e. national standards, food science, technical and training support to other laboratories of the government). The economic value of these activities is difficult to measure, but the involvement of the edible oil sector can be a certain guarantee for the efficiency and effectiveness. Presently these activities are done by government laboratories CTQM for quality aspects, Seed Laboratory for quality and food safety aspects and the three FDA laboratories for food safety aspects. For all these laboratories, the testing of oil crop products is only a part of their activities and none of them has the equipment and know-how to perform all necessary parameters, leaving aside that they are accredited for these applications. A specialised laboratory for oil crop products, the original idea why NEOQCL has been built, could be an effective and productive solution in this situation.

Trainings and accreditation

In the business plan of NEOQCL we distinguish two stages:

1. NEOQCL starts testing for the members of MEODA after receiving some basic training, trainings on specific analysis for oilseeds and edible oils and the necessary supplies. These costs are estimated at USD50,000. Stage 1 can be started immediately, but there is this precondition: clarification of the position of NEOQCL towards its stakeholders. NEOQCL has to be able to cooperate intensively

[9] The costs of salaries, other (stationary) costs an depreciation are estimated at USD86,500 per year and the average gross margin per parameter USD4.5. USD86,500 : USD4.5 = 19,222 parameters.

with MEODA, not only for testing but also for broader support. If this precondition is not met, there is no use in providing trainings and supplies.

2. NEOQCL starts the course for accreditation, with all technical support and trainings needed for quality control systems and method development. These cost are estimated at USD221,500 and a duration of 1.5 to 3 years. Stage 2 needs more preparation, technically because it is complex and expensive, organisationally because it needs synchronising with the needs and development of the oil crop sector. The precondition is similar to stage 1, but it will need more time, because the role of a certified government laboratory in the Myanmar food control system is more complex and has more international aspects. More and better coordination and agreements with all stakeholders are needed.

A public-private partnership with the involved governments, the laboratories, science sector and the edible oil and oilseeds sector can be a solution to discuss and to plan future actions.

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REPORT
LEI 2014-036

LEI Wageningen UR carries out socio-economic research and is the strategic partner for governments and the business community in the field of sustainable economic development within the domain of food and the living environment. LEI is part of Wageningen UR (University and Research centre), forming the Social Sciences Group together with the Department of Social Sciences and Wageningen UR Centre for Development Innovation.

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REPORT
LEI 2014-036
ISBN 978-90-8615-701-3

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