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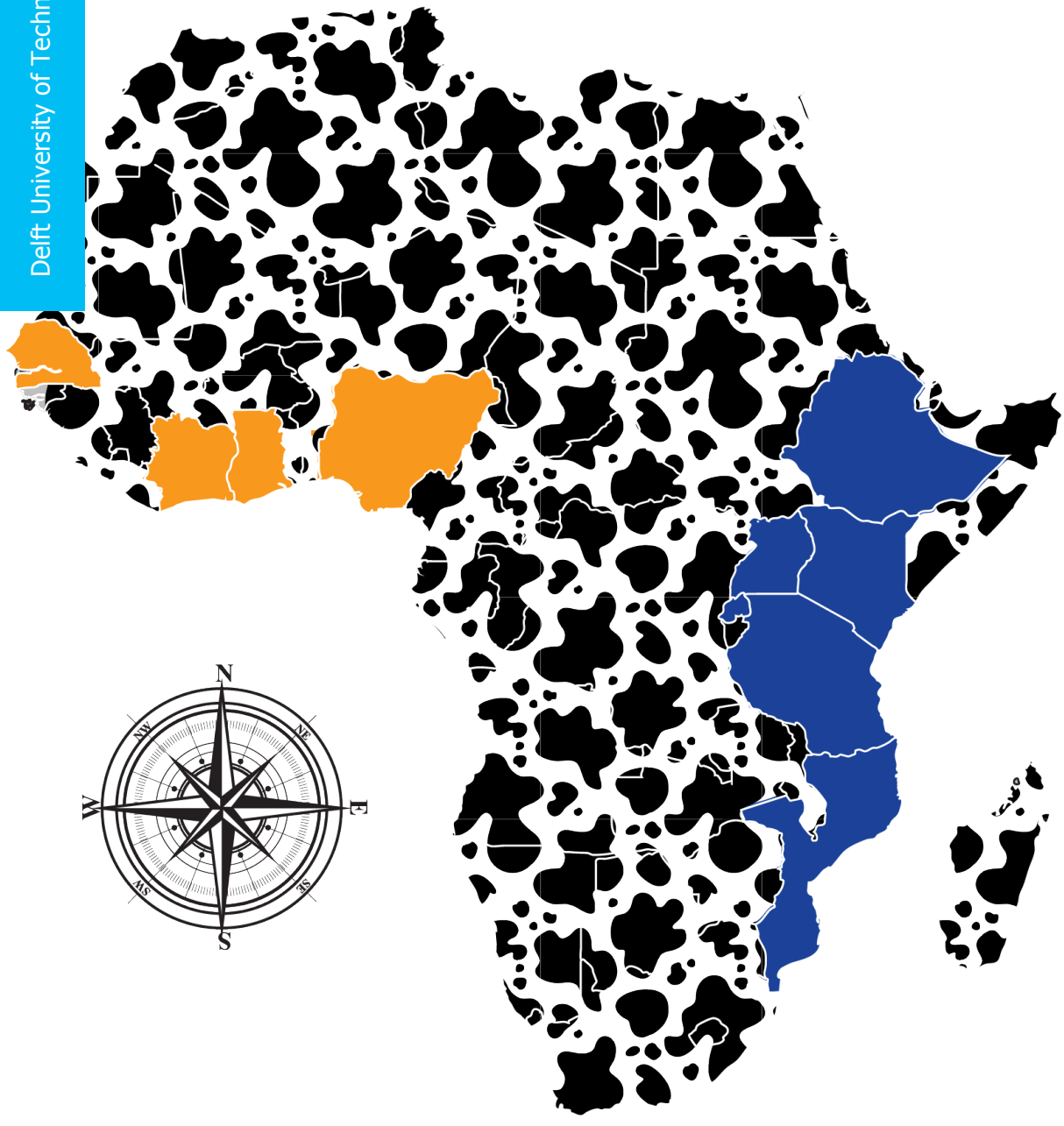
Navigating uncertainty in the contextual business environment

Delft University of Technology



PLANNING FOR INVESTMENT IN THE DAIRY FUTURE OF SUB-SAHARAN AFRICA

Navigating uncertainty in the contextual business environment

by

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EXECUTIVE SUMMARY

Prices have continued to fall in a global dairy market dealing with exceptionally strong supply growth – in particular EU milk quota removal at the time of writing – and reduced buying. The stress has renewed the sense of urgency and caused the search for new markets to move higher up in the strategic agenda of international dairy companies. With a long-term outlook of an average increase in consumption at 2.2% per annum for developing countries as opposed to less than 1% per annum in the developed world, Africa has become the new target. The continent could become a trillion-dollar food market by 2030, but the tendency to evaluate Africa as if the continent constitutes "one big country" undermines strategic business development.

The purpose of this report is to provide support to clients in the dairy sector to decide *whether or not to invest in business development in Sub-Saharan Africa and if so, where and how*. The reason why many players continue to circle around the continent in search for opportunities for expansion is twofold. First, there is uncertainty following a lack of insight into the amount of dairy available in the global markets soaked up by Africa and differences in access to market. Also, understanding of the complex dynamics of the 'black box' of African dairy business is limited. Second, there is uncertainty due to variability inherent to the sector and region, which renders dairy business development a matter of navigating uncertainty. Even though the options appear straightforward – direct trade, milk reconstitution or setting up local production – actually satisfying demand is not.

In order to unlock the paralysis, three research methods have been used. Trade flow mapping yielded the insight that regional differences matter. West Africa relies heavily on bulk powder milk imports because the climate challenges the path towards achieving self-sufficiency. In East Africa, trade is yet no lucrative business. Protectionist measures, aimed at enabling local players to unlock the potential for low-cost milk production on the grasslands and highland, are effective. For the ten countries under consideration, per capita import volumes are notably higher for (coastal) countries with lower import tariffs.

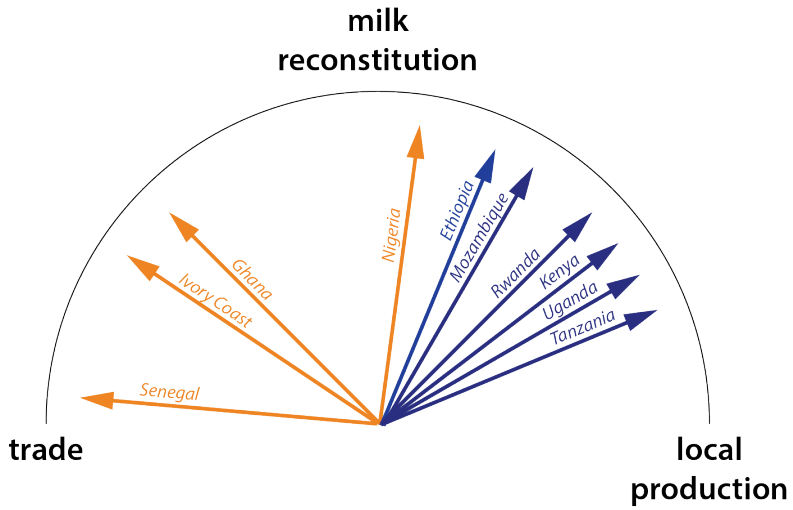
Three types of uncertainty add to the wickedness of the dairy business development challenge:

- Lack of knowledge about the causes and effects of the irregular flow of milk and money throughout the chain results in *cognitive uncertainty*
- Opportunistic behaviour gives rise to (1) lengthy chains characterized by a virtual lack of control on price and quality, and in turn (2) the challenge to compete with the informal market channels – in other words, *strategic uncertainty*
- Unpredictability of interaction with the fragmented African public authority, particularly at the border, which results in *institutional uncertainty*.

Analysing the complex dynamics of the multi-actor setting yielded the insight that there is a structural need for affordable farm inputs to overcome the seasonality of production and for additional liquidity within the chain to reduce opportunism. Coalitions and contracts are key. However, they are suitable to coping with inherent variability of the macro-environment to which the African dairy business is exposed.

The point of scenario planning is not to pick one preferred future and hope for it to come to pass, nor to find the most probable future and prepare for it. The uncertainty associated with the driving forces of African dairy business – close to the level of recognised ignorance – requires thorough consideration of a wider range of possible futures. What if the resource curse results in severe political instability and the Dutch disease catching the African dairy sector? What if foreign investors become hitched to the African wagon of dairy sector development? What if African governments, for the sake of food security, temporarily ignore trade imbalances and target their

efforts on negotiating some sort of Nesquick deal? Thinking through various paths to the future fed into the conclusion that investing in African dairy is not for the risk averse. Robust plans do not exist. This business challenge calls for adaptive plans. Dairy trade and setting up local milk are complements, not substitutes. A mixed approach should be the starting point and the balance between the two extremes should be shifted as the future actually unfolds and forks in the road appear.



Moreover, the country-by-country strategy guide reveals that the chance of success under current conditions makes this balance tend more towards trade for West African countries and more towards setting up local production for East African countries. The scenarios and strategy guide support investment decisions made today, but making return on investment requires monitoring several signposts on a continuous basis:

- Jumps or cuts in tariff profiles given consolidation of regional trade agreements and the rise of a "can-do" attitude among African governments
- African private capital investments into dairy
- Opening and survival of supermarkets in Sub-Saharan Africa, as well as the frequency of empty shelves
- Global food scandals
- Remarkably large bilateral dairy trade flows that could indicate new strategic trade routes
- Discovery of reserves and closing down of operations in the oil, gas and mining industry of Sub-Saharan Africa.

This research project could strengthen the position of Rabobank International in several ways. First, initiating and continuing the dialogue about the unfolding of the African dairy future is crucial to the value proposition of relationship banker. Large trade flows and sector dynamics discovered today may have disappeared tomorrow. It is vitally important not to present solely a static overview of the sector as it is, but to help navigate uncertainty in the contextual business environment on a continuous basis. The cross-organizational scenario planning process has turned some black swans into white, thereby allowing for better assessment of financial risks attached to provision for financial services. Whereas available products can already leverage some of the banking opportunities identified, further steps are urgently recommended to increase the ability to financially support the set-up of local milk production systems. Rabobank should assist its African partner banks in helping their clients build transactional transparency as well as in the gradual replacement of collateral by cash flow principles in order to increase access to finance of small and medium dairy enterprises. Moreover, Rabobank should radically innovate and diversify its product portfolio in the field of supply chain finance. Both steps are crucially needed, in the short term to

create additional liquidity within the dairy chain, and in the long term to promote sustainable development of the global food and agricultural sector.
While this sector becomes increasingly capital-intensive, consolidated and at the mercy of global commodity prices that affect both revenue and cost side, the resemblance to the industries in which scenario planning has gained its popularity is growing. Through redeployment of scenario planning in sectors other than dairy, Rabobank could provide systematic decision support to clients operating in an ever more globalized sector where interconnectedness intensifies structural complexity. As such, this research project contributes to the fundamental question of how to fulfil the cumulative gross capital requirements for developing countries' agriculture adding up to a total of nearly US$9.2 trillion need in order to be able to feed the world by 2050. All in all, actionable lessons drawn from the African dairy case can help Rabobank in living up its cohesive vision: Banking for Food.

ABSTRACT

The rise of the dairy consumer in Sub-Saharan Africa

Dairy demand development in Africa is particularly attractive to investors. The population is projected to double in the coming decades, urbanization is occurring rapidly and incomes rise to a level that allows consumers to shift to a dietary pattern richer in protein. Demand development feeds the desire to expand in to the Sub-Saharan African market. For the corporate decision-maker, however, seizing this opportunity so as to fulfil the prime economic responsibility of making profit appears to be a severe challenge. Many have continued to circle around the continent, paralyzed by the general threat of what Mazrui calls the 'African condition' causing investors to perceive the continent as more risky than fundamentals can explain. The paralysis is perpetuated by specific threats to dairy farming and processing in Africa, such as frequent blackouts resulting in spoilage of raw milk during transportation or at processing facilities and low productivity of imported breeds due to environmental stress. In spite of the general and dairy-specific uncertainties so threatening to investors, decisions have to be made. The focal decision to which this thesis aims to provide decision support is: '*Whether or not to invest in dairy business development in Sub-Saharan Africa and if so, where and how*'. Results should assist clients of Rabobank International, the commissioner of this case study, in developing a plan and choosing a target country for investment, given all the uncertainties surrounding the decision.

Supporting investors in the face of uncertainty of varying natures

The majority of those with intentions to invest in African dairy have not yet made plans concrete or not even been able to draw up to a sensible plan for investment. They are facing uncertainty. In this report, uncertainty due to *lack of knowledge* is distinguished from uncertainty due to *variability inherent* to the sector under consideration. Uncertainties of both natures are clearly present. A combined approach has been used to reduce uncertainty or to navigate uncertainty insofar irreducible.

In Sub-Saharan Africa, the practice of collecting and sharing data is hardly institutionalized. If available, data may be incorrect and incomplete due to corruption and the prevalence of informal markets. Therefore, this research project is predominantly qualitative in nature.

Nevertheless, knowledge has been acquired through dairy **trade flow mapping**. The low level of intra-African trade implies that the greater part of the pattern can be drawn up by relying on quantities as reported by the non-African partner in the transaction. Analysis of trade statistics helps to break the tendency to evaluate Africa as if the continent constitutes "one big country". Trade patterns equip the corporate decision-maker with knowledge about regional differences in access to market.

However, the knowledge gap filled through trade mapping is not enough to unlock the paralysis among investors. A second approach, **strategy analysis of multi-actor systems**, allows for taking an active part in explaining why business development is perceived as a challenge. The core of the answer lies with variability uncertainty. Investigation of the 'black box' of African dairy and interests, objectives and resources of actors involved yielded better understanding of the sources of variability uncertainty contributing to the wickedness of the business challenge. Lack of knowledge about the causes and effects of the irregular flow of milk and money throughout the value chain results in *cognitive uncertainty*. Opportunistic behaviour gives rise to (1) lengthy chains characterized by a virtual lack of control on price and quality, and in turn (2) the challenge to compete with the informal market channels – in other words, *strategic uncertainty*. Unpredictability of interaction with the fragmented African public authority, particularly at the border results in *institutional uncertainty*. Apart from allowing for diagnosis, these research efforts have resulted in

improved understanding of complex dynamics inherent to dairy business development in multi-actor setting, which in turn may increase the chance of successful investment.
Variability uncertainty nevertheless remains. Particularly randomness induced by variation associated with external driving forces is threatening to investors. Therefore, as a third approach, **scenario planning** has been applied to address uncertainty about political, economical, social, technical and ecological trends and trend breaks and how they interfere with the complex business dynamics, thereby ultimately the success of investment in African dairy. Although one cannot know the future, thinking through a wider array of hypothetical sequences of possible events for the purpose of focusing attention on decision-points can help to help navigate this irreducible variability uncertainty.
For the most part, steps proposed by Schwartz have been followed, a scenario development model that belongs to intuitive logics approach. Rabobank International as financial service provider essentially is an external party to African dairy business, whereas the intuitive logics methodology is usually applied by a team *internal* to the organization making the focal decision. Therefore, the research set up has been adjusted so as to accommodate the interests of various organizations.

Tailoring scenario approach to cross-organizational setting

Scenarios are useful vehicles for making better investment decisions, which is in the interest of both Rabobank and clients operating in or supplying to the dairy industry. Because critical interdependencies between these clients exist, the cross-organization research set up has been designed to prevent from competitive rivalry resulting in limited willingness to participate or share information during the scenario process.

With participants scattered over multiple organizations and across the globe, opportunities for bringing them together are limited. However, the position of Rabobank is powerful in bringing together their perspectives, thereby steering towards substantive enrichment of scenarios. The traditional banker's role of trust and keeping all business information confidential is crucial therein. Key features of the cross-organizational approach followed are iteration and a leading role for the scenario planner, which is located outside of organization making the investment decision, as compared to cross-pollination and a carefully composed scenario development team.
Because of the iterative nature of the process being executed across organizational boundaries, an alternative approach for ranking driving forces by impact and uncertainty has been developed. In the approach of Schwartz participant perceptions tend to gradually converge, thereby facilitating the identification of two or three scenario drivers. In contrast, in the cross-organizational approach, driving forces identified during interviews with clients and external experts have been grouped together by the scenario planner before sending out the requests for ranking in absolute *and* relative terms to participants. The rationale for double ranking is that it (1) increases awareness of the inherent variability associated with the African continent and (2) provides an incentive for participants to ensure greater thoroughness and consistency in filling out the ranking table. Those driving forces that could be assumed predetermined or highly certain (e.g. demographics) have been left aside for the purpose of easing up the ranking procedure. In spite of the diversity of respondents, this procedure revealed a surprising consistency regarding top-ranked driving forces.

The three locations in the grid, which follows from plotting these scenario drivers along axes, are characteristic to the logic of scenarios. Due to the iterative set up, the final phase of constructing courses of the future has not been intensely participatory, but fleshed out by the external scenario planner. However, as a form of quality assurance, Dutch Embassies in Sub-Saharan African has been consulted to check whether the backbone of the selected scenario logics appeared plausible.

Systematic treatment of multidimensional uncertainty in decision support

The uncertainty matrix below – a tool for identifying and characterizing the potential uncertainty in decision support – has been applied to evaluate the suitability of the research approach for the African dairy case study. This matrix suggests that uncertainty is a three-dimensional concept

defined by location, level and nature. The above description of the combined approach already links the nature of uncertainties to the three steps. It should be noted that because this case study revealed that business development is fraught by an omnipresence of variability uncertainty, which moreover is partially irreducible, it proved impossible to draw up meaningful 'pictures' of the African dairy sector in a couple of decades. Rather than sketching an endpoint, the scenario process sketched possible *courses* of the future. In other words, they resemble more of a trend extrapolation than scenarios in the common interpretation of the intuitive logics school.

		Level			Nature	
Location		Statistical uncertainty	Scenario uncertainty	Recognised ignorance	Epistemic uncertainty	Variability uncertainty
Context	*PEST representation*		X			X
Model	*Model structure*					
	Technical model					
Inputs	*Driving forces*		X			X
	System data	X			X	
Parameters						
Model outcomes				X		X

Nevertheless, the constructed scenarios are well suited to the focal decision because much of the uncertainty appears to be located in the context, the input of driving forces and how these uncertainties are multiplied throughout the chain of causal effect within the former 'black box' of African dairy. These uncertainties manifest themselves at a very high level, close to the ignorance extreme. Thus, on the basis of this matrix, it has been concluded that the African dairy case calls for robust or adaptive plans.

Implications of uncertainty for investment

How have the intermediate products of the three approaches – dairy trade flow maps, a systems diagram and scenarios – been transformed into more concrete decision support?

The country-by-country strategy guide follows from a simple multi-criteria assessment that is rooted in acquired insight regarding access to market and a selection of key systems factors found to influence success. The outcomes give an indication of relative attractiveness of the available options for business development – direct trade, milk reconstitution or setting up local production – in each country under consideration. The position of one country relative to another has again been checked with the Dutch Embassies for sensibility.

Review of the focal investment decision against the constructed scenarios generated insight regarding the risk profile; therewith the basis for recommendations for shaping investment plans. In conclusion, African dairy business is not for the risk averse. None of the available options for dairy business development is robust across all scenarios. Therefore, solely adaptive strategies can help navigate uncertainty in the contextual environment. Trade and investment in setting up local dairy value chains should be regarded complements, not substitutes. A mixed approach should serve as the starting point. The balance between the two extremes of the spectrum of business development options should be shifted as the future actually unfolds and forks in the road appear. To anticipate the need for adaptation, a list of leading indicators and signposts has been drawn up on the basis of the structure of the systems diagram and the logical coherence built into the three possible course of the future.

Together, these outcomes – country guide, overall risk profile and list of indicators to monitor – support the corporate decision-maker in fulfilling the fundamental economic responsibility of making profit. It should however be noted that further corporate responsibilities, although widely reckoned by participants, tend to be submerged in the decision support. This limitation follows from the rule of thumb underlying scenario planning that avoids proliferation of scenarios around every possible uncertainty.

From African dairy case to the role of the bank in global food and agriculture

The tendency of investors to first develop a plan before seeking financial services to realize these plans may be reversed through cross-organizational scenario planning. The African dairy case study reveals that taking an active part in providing support to investment planning helps to unlock the paralysis, thereby creating banking opportunities. Scenario research has set the scene for reaching out to clients. While the relationship bankers gains a competitive advantage from early involvement, clients get better understanding of the variety of financial products that could support expansion. Moreover, blacks swans may be turned into white during the interviews. The associated reduction of financial risk is in the interest of both investor as well as the bank making the investment possible.

Lessons drawn must be put in perspective. The global food and agriculture landscape is changing, resulting in increased resemblance to the industries that are associated with high proportions of scenario users. This conclusion follows from two key trends. First, structural transformation through consolidation and multinationalization is observed. Second, the industry is become more capital intensive. With cumulative gross capital requirements for developing countries' agriculture adding up to a total of nearly US$9.2 trillion needed in order to be able to feed the world by 2050, these lessons have implications for the role of the bank in solving societal challenges.

Cross-organizational scenario research in itself has the potential to spur capital investments, but further steps are urgently needed. While the wide range of traditional trade and commodity finance products can already adequately support expansion plans located on the one end of the spectrum, revision of practices and innovation in financial products are urgently needed to support the setting up of food value chains locally.

By helping its African partner banks in shifting form collateral to cash flow principles, which is at the crux of the matter for small and medium enterprises' access to finance, Rabobank could support the inclusion of African parties in the value chains being set up. Moreover, through its partner banks, Rabobank could help potential African clients build transactional transparency. While yet effectively absent in the lengthy and largely informal African value chain, the lack of transparency is a fundamental obstacle to provision of financial services.

The field of supply chain finance (SCF) deserves particular attention. The rationale behind these products is to leverage the creditworthiness of large corporations for improving access to affordable liquidity, thereby helping small-scale suppliers to sidestep restrictions in their conventional lines of credit. The penetration of SCF is yet very limited and insofar provided, coming from global development banks. Acknowledgement of the increasingly pan-regional supplier base of food corporates as well as their mutual dependency directly implies acknowledgment of a growing demand for SCF. To keep up with business development of clients, Rabobank would need to drastically expand and diversify its range of SCF products. As small-scale suppliers of today may be creditworthy clients of tomorrow, financial innovation is fundamental to enlarge Rabobank's business base.

Points of improvement for redeployment of research set up

The tailored scenario approach is promising in the light of a changing role of the bank. However, several key issues arose that feed into three important points of improvement:

- Framing the focal issue as sector or business *ecosystem* development to foster the belief that participation in scenario building is in everyone's interest
- Seek an efficient middle between full iteration and workshop set up that allows for making scenario building less resource-intensive while preventing competitive rivalry from undermining the participant's willingness to share substantive knowledge
- Introducing an shared definition of dividing line between absolute classifications of impact and uncertainty that allows for meaningful translation into an aggregate ranking, thereby making it possible for the alternative ranking procedure to deliver its benefits

Future research

Steps for academia that follow from this African dairy case study are:

- Analysis of the potential and prospects of the cross-organizational set up, in particular whether if applied from a banking perspective, the scenario process could form basis of trust and cooperation, thereby ultimately lead to a self-fulfilling prophecy
- Review of the use of scenario methods in the changing landscape food and agriculture, including evidence of impact on spurring the capital investments needed
- Exploration of possibilities for proper integration of corporate social responsibilities in the decision support in order to prevent scenarios from reinforcing the tendency of taking the blinkered, economic view on the focal decision.

CONTENTS

LIST OF ABBREVIATIONS

AI	Artificial Insemination
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ECOWAS	Economic COmmunity of West African States
EF	Export Finance
EU	European Union
F&A	Food & Agri
FAO	Food and Agricultural Organization of the United Nations
FAR	Food & Agribusiness Research and Advisory
FDI	Foreign Direct Investment
FFMP	Fat-Filled Milk Powder
GDP	Gross Domestic Product
GTIS	Global Trade Atlas
IMF	Infant Milk Formula
LPI	Logistics Performance Index
M&A	Mergers & Acquisitions
MCC	Milk Collection Centre
MENA	Middle East and North Africa
MEQ	liquid Milk EQuivalents
OECD	Organisation for Economic Cooperation and Development
SADC	Southern Africa Development Community
SCF	Supply Chain Finance
SMP	Skimmed Milk Powder
TCF	Trade and Commodity Finance
UNCTAD	United Nations Conference on Trade and Development
US	United States
VAT	Value-Added Tax
WMP	Whole Milk Powder
WTO	World Trade Organization

1. GENERAL INTRODUCTION

Africa could become a trillion-dollar food market by 2030 (World Bank, 2013). The opportunity has not gone unnoticed by international market players. Many are planning for investment in the dairy future of Sub-Saharan Africa. What is the promise of this region? Why have many potential players continued to circle around the continent without actually getting involved? This thesis project aims to help them navigating the uncertainty in the contextual dairy business environment.

1.1 GLOBAL DAIRY AT A CROSSROADS

By the end of 2014, the Rabobank Dairy Quarterly ran the headline: 'Dairy prices continue to fall'. The global dairy industry is in stormy waters. Low prices were required to help clear a market dealing with exceptionally strong supply growth, in which the European production expansion in the run up to the removal of EU milk quotas as from April 2015 onwards has played a notable role. The rising US dollar, a weak economic environment and reduced buying from China and Russia added to the stress that moved the topic of expansion into new markets up in the strategic agenda of international dairy companies.
Notwithstanding this renewed sense of urgency, it predominantly is the long-term outlook that makes suppliers seeking a new home on the international market. Domestic milk production systems in former import regions, particularly Asia, are substantially improving (Matthew Johnson, personal communication, n.d.). The prospects for dairy demand are, however, not receding. The agricultural outlook 2013-2022 as published by the OECD and FAO (2013) states that global dairy consumption is expected to increase 38% by 2022, but the outlook is not equally bright across all regions. In developing countries, the consumption of dairy products is expected to increase on average at about 2.2% per annum. In contrast, dairy consumption in the developed world is projected to increase on average by less than 1% per annum and to be less than the growth in production. Following the Asian dairy success stories, for example the easy money that has been made in China through sales of infant milk formula (Rabobank, 2015), international market players are increasingly attracted by the rise of the African consumer (Hattingh et al., 2012). In their annual reports, many dairy companies (e.g. FrieslandCampina, 2014; Arla Foods, 2014; Danone, 2014) have announced Africa as their new strategic target. The prospects have already drawn in some of the main dairy players while others wait in the wings.

1.2 THE PROMISE OF SUB-SAHARAN AFRICA

The tendency to evaluate Africa as if the continent constitutes "one big country" – rather than its actual fragmented state (UNCTAD, 2013) – undermines strategic business development. Regional differences matter. Morocco, Algeria, Tunisia, Libya and Egypt have a comparatively mature dairy landscape with, by 2013, aggregate imports accounting for almost ten percent of the world dairy trade volume in liquid milk equivalents (MEQ). Moreover, they belong to the fairly different economy of the Middle East and Africa (MENA). Except from South Africa, the African continent is generally characterized by a dairy sector that is still in its infancy.

Given that no two African countries are the same, a selection of ten countries in Sub-Saharan Africa has been made on the basis of their expected potential and questions raised by Rabobank clients. Figure 1 shows the countries, as well as some key socio-economic indicators, that have been subject to closer study.

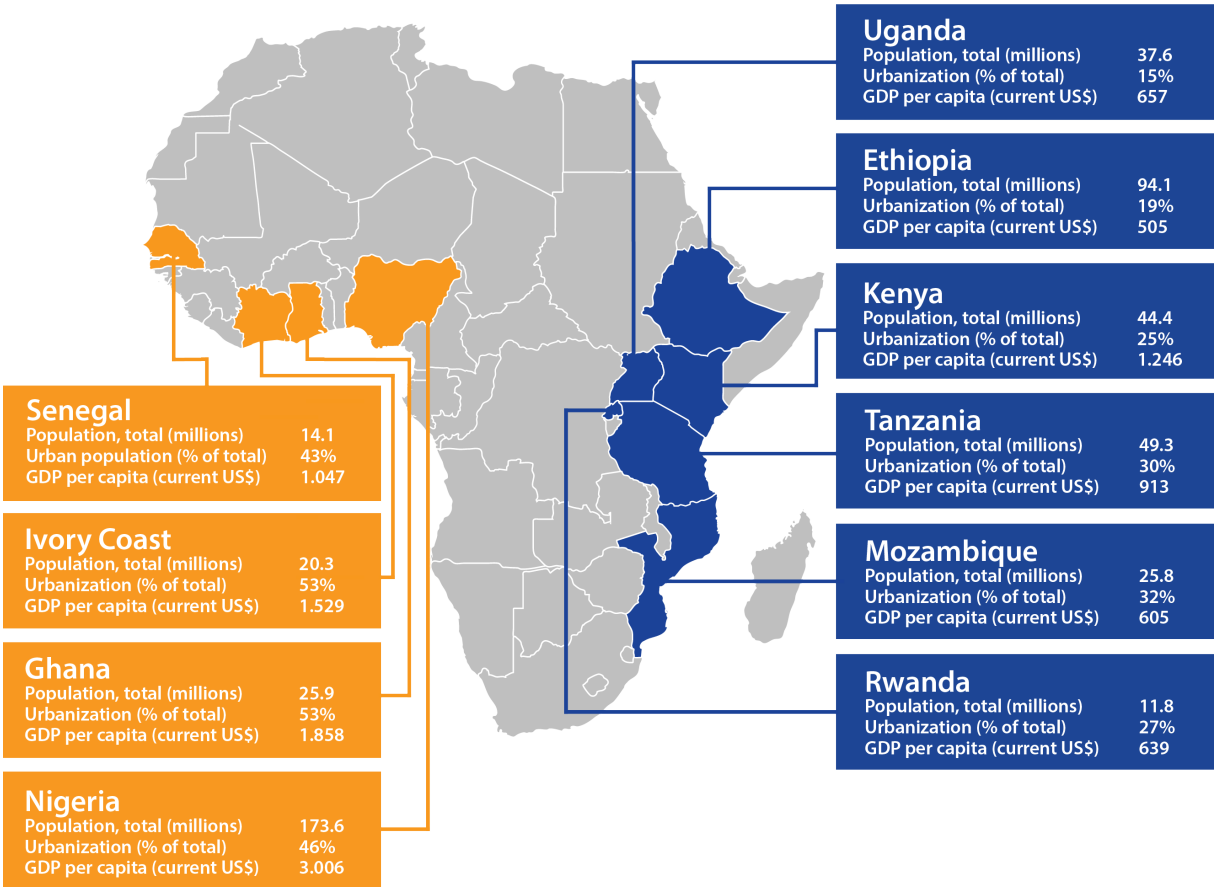


Figure 1 - Socio-economic indicators (Worldbank, 2013) of selected Sub-Saharan African countries

The fact that in the past decades, dairy products have consistently represented around ten percent of total food imports into Africa, rendering it the runner up of cereals (Rakotoarisoa, Iafrate and Paschali, 2011) reveals that there has long been a gap in the market filled by foreign dairy producers. This gap is widening. Why? What are the seeds to the rise of the African dairy consumer? The predominant driver is the growth of income levels. Developing countries are projected to continue to diversify their diets with a movement away from basic staples and grains to higher protein foods, including dairy products as their incomes and general affluence increase (OECD and FAO, 2013). GDP per capita in the selected West African countries is well above 1000 USD, notably higher than on the other side of the continent. In East Africa, GDP per capita is generally around 600 USD, with Kenya being the exception to the rule (see figure 1).

Demographics help to shed further light on demand development. The Saharan African baby boom will have profound implications. The population of Sub-Saharan African countries is projected to double – for some nearly triple – by 2050 compared to today (Pflanz, 2013). Moreover, the share of the population living in urban areas is growing. In West Africa, Ghana and Ivory Coast have already achieved a similar rate of urbanization as China (World Bank, 2013). Although in East Africa less than one third of the population lives in urban areas, migration away from the countryside is also observed. These dynamics are reflected in a move away from on-farm milk consumption and informal rural markets and the rise of retail channels in which international players can actually operate. Altogether, these drivers or demand translate in what may be called the promise of Sub-Saharan Africa.

1.3 THE DAIRY SECTOR IN SUB-SAHARAN AFRICA

The formalization of retail is associated with a gradual transformation of the African dairy sector. Today, as extensively described in reports by Wageningen University (van der Lee et al., 2013;

Makoni et al. 2014) and confirmed during the interviews (see appendix H), the sector is characterized by the coexistence of a formal and informal market. The influence of the informal market is particularly dominant in East Africa, where raw milk production is well possible in for example the grasslands of Uganda, the Kenyan highlands and the Zambezi valley in Mozambique. Raw milk is either consumed on-farm or sold directly – or indirectly through loose milk traders which may be licensed and through petty milk traders – on the local (rural) market. In the East African countries under consideration, informal marketing of raw milk currently accounts for 80% (Kenya, Uganda, Rwanda) to 97% (Tanzania) of local dairy consumption (Makoni et al. 2014). Some of the raw milk flows to milk collection centres (MCCs), which are owned by the private investors, the government, dairy farmer cooperatives or processors. From there, milk is transported in refrigerated trucks to processing facilities. Eventually, dried and/or value-added dairy products are sold by retailers. The fact that some raw milk is collected for processing does not necessarily mean that this milk actually flows through the supply chain all the way to retail. Spoilage is common. For example, following estimates of Makoni et al. (2014), roughly 35% of the Ethiopian milk gets spoiled. Moreover, side selling occurs at all stages of the value chain. As vividly illustrated by the Dutch Embassy in Addis Ababa (personal communication, 5 June 2015), even when a truck reaches the supermarket, the load dairy products may not reach the shelves. The products may be sold right from the truck to crowds of consumers that have gathered around.
The West African dairy sector has a similar value chain, although the informal market is less dominant. This can be explained by the fact that local milk production is constrained to sub-humid and semi-arid zones and low cow productivity, resulting in limited availability of raw milk. Moreover, the West African consumer prefers dried over liquid milk.
Dairy originating from beyond the African continent automatically enters the formal market segment. However, that does not mean that the channel to market is known. There is an equally vibrant small-scale trading sector. Small quantities of value-added products – either directly imported or locally processed out of imported powdered milk – and portion sachets of affordable bulk products generally pass through many hands before ending up with the African consumer.

1.4 BUSINESS DEVELOPMENT IN A CHALLENGING CONTEXTUAL ENVIRONMENT

The nature of the sector already reveals that Sub-Saharan Africa is not about doing dairy business as usual. This research project serves the interest of Rabobank clients, who operate in the formal market segment. In other words, the focus lies with planning for investment in the changing formal dairy landscape of Sub-Saharan Africa. Change has been confirmed by many of the interviewees, but others (e.g. Hattingh et al. 2012) have concluded that there are signs that the modernization of retail will dramatically increase in coming years.

The interaction between trade and foreign direct investment (FDI), as reviewed by Fontagné (1999), is at the core of globalisation. The classical view of these forms of business development being substitutes has been faded out and the perception of being complementary has become more widely accepted. Following the period up to the mid-1980s, during which trade caused investment, the reverse causal relationship seems to hold for the more recent decades. This turning point should be considered against the fact that intra-firm trade accounts for an increasing share of world trade. What does the entanglement of trade and investment imply for dairy business development? It means that the strategy spectrum boils down to three options for entering the market:

- Direct export of value-added dairy products on the one end,
- Setting up the African dairy value chain, including local milk production on the other, or
- Reconstitution, i.e. exporting milk powder to be processed locally into a wider range of value-added dairy products.

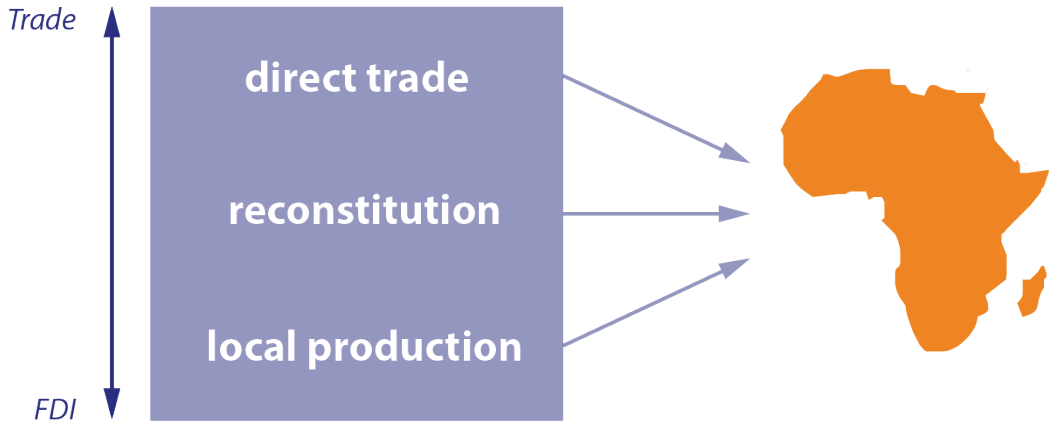


Figure 2 - Options for dairy business development

Although these options may seem straightforward, actually doing business is not. The dairy sector is subject to various sources of uncertainty with are generally beyond control of the business developer (see box 1).

Box 1. Uncowed – What milk trade reveals about a country

For Muhammadu Abubakar, life is an uphill struggle. Farming in Nigeria is tricky at the best of times. Only the brave of the downright crazy would think of dealing in a perishable product like milk. On his ranch on the dusty fringes of Kano, the biggest city in Nigeria's north, he faces a daunting array of problems. The electricity grid is hopeless. So, at the gateway, two generators splutter away 24 hours a day. Diesel sets Mr Abubakar back about 1M naira ($5,100) a month. "We've had two hours of power in three days," he says. "There's no option."

There are no good cows for sale nearby, so Mr Abubakar's company, L&Z Integrated Farms, plans to start importing its own. There are no good seeds for fodder; he brought in cutting on a commercial flight from Kenya. There is no mains water, so he must drill boreholes to irrigate his fields. Fertile land has a tendency to turn to dust. He has to train his own staff to use complicated machinery. Plenty of batches get spoilt along the way. By the time it is processed, a litre of milk has already cost about 320 naira (£1) to produce.

Then the milk has to get to market. "Three or four years ago we used to fly our milk down to Lagos," he says. "It cost a fortune. The milk would spoil sitting in the airport. We had to pay off customs. It was a nightmare." Nowadays, the firm uses costly refrigerated trucks instead. Drivers must brave day-long journeys on disintegrating roads. Each truck requires about 200,000 naira ($1,000) in opaque licence fees every month. Even when those are paid, local authorities send thugs out to get more.

"They make you buy new paperwork," one trucker says. "We probably pay 3,000–4,000 naira (roughly $15–$20) every journey." When the milk finally arrives on the shelves, it costs around three times what it would in Europe. Cheap long-life imports sell for less than half the price of local milk. Nigeria spends roughly $1M a day on imported milk powder, according to Sahel capital, a private equity group which recently invested the same amount into Mr Abubakar's business in the hope of changing that.

[…]

Mr Abubakar remains one of a depressingly small group of commercial farmers in Nigeria. Most of his dairy competitors, he says, are politicians who "can afford to sink money into it". Yet for all the difficulties he faces, he is struggling to meet demand. "We are making a very good profit", he says. "If you can do that with milk, you can do it with anything."

Source: The Economist (2015)

In conclusion, both dairy farming and processing are threatened by fundamental challenges. One will need standalone energy systems to cope with frequent blackouts. Land ownership is hardly possible in Africa. Long-term land lease serves as a replacement, but may hamper access to collateral finance (Rabo Development, personal communication, 10 March 2015). The cold chain is underdeveloped in many regions, rendering the local sourcing of low-cost milk impossible. Artificial insemination (AI), which is considered crucial to raising the mik yields per cow, restricted by the lack of access to liquid nitrogen (*external client*, personal communication, 9 March 2015).

Apart from dairy-specific threats, the paralysis among investors arises from three paradoxes of what Mazrui (1980) calls the 'African condition'. The paradox of acculturation refers to the massive assault on African peoples by Western cultural and political forms, which had the effect of overwhelming traditional values and, as the physical colonial presence receded, left Africans with conflicting sets of identities. The paradox of fragmentation is at the root of African economic underdevelopment, which can be traced back to technical backwardness, maldistribution and the existence of many poverty-stricken societies within a resource-endowed continent. The pathology of a fragmented economy in turn creates the paradox of retardation. Put briefly, this third paradox is about the continent not acting as a unit in world affairs. In the contrary, the continent is subject to the weakness of its national, ethnic, ideological and religious cleavages.

Uncertainty and unpredictability are inextricably linked to the African condition. Also Rakotoarisoa, Iafrate and Paschali (2011) state that insecurity and instability are among the problems turn away both local and foreign investors. The courses of post-independence politics in Africa have been erratic and marked by numerous internal and even regional conflicts Infrastructure needed for milk production and distribution may be damaged or completely destroyed as a result of wars and civil unrest.

As challenging as it already may be to domestic entrepreneurs to set up local dairy business, foreign investors may actually need even more bravery to succeed. Sub-Saharan African countries have on average received far less FDI than other developing regions. Asiedu (2002) gives two plausible explanations. First, the continent is perceived as being inherently risky. In other words, African countries are being rated riskier than warranted by the fundamentals (Haque, Nelson, Mathieson, 2000). Second, the tendency to evaluate Africa as if it constitutes "one big country" implies that due to the lack of country-specific knowledge, investment decisions are often guided by the inferred risk perception of neighbouring countries.
Those pinning their hopes on trade do not experience a greater ease of doing business. Openness to trade in Sub-Saharan Africa in generally low (Asiedu, 2002). The average applied tariff barriers in Sub-Saharan Africa were 17.7 per cent by 2003, compared to 3.9 per cent in OECD countries (Tupy, 2005). The focal sector makes prospects even less bright. Dairy remains top-ranked agricultural sectors it comes protectionist barriers to global trade (USDA, 2006). The East African Community (EAC), for example, applies tariffs on import of dairy products as high as 60 per cent (WTO, 2014). The heavy dependency of African governments on income from duties (Kommerskollegium, 2010) hampers efforts towards tariff liberalization. Moreover, foreign investors do not perceive reform of protectionist policies as credible – liberalization moves by the government are perceived as transitory and therefore subject to reversal (Asiedu, 2002). Non-tariff barriers are at least as detrimental to trade. According to Tupy (2005), nontariff protection in the poorest countries of Sub-Saharan Africa is four times greater than nontariff protection in rich countries. Red tape at the border incurs high cost and dairy products get spoiled while waiting to be clear in the port. The number of border authorities is generally large (Kommerskollegium, 2010) and many Sub-Saharan African countries belong to world's bottom quintile if it comes to the efficiency of customs and border procedure (Arvis et al., 2014).
All these conditions, combined with corruption, underdeveloped institutions and weak governance — make international trade and investment in Africa extremely costly (Portugal-Perez and Wilson, 2008).

Also the consumption side is fraught with uncertainty. In Ethiopia, dairy demand variations are severe due to religious fasting practices lasting 180 per year (Makoni et al., 2014). Some African populations, Mozambicans for example, are by tradition no dairy consumers (*external client*, personal communication, 26 March 2015). Consequently, the actual responsiveness of dairy consumption to rising incomes is unknown.

1.5 SCOPE AND RESEARCH QUESTIONS

All in all, the promise of Sub-Saharan Africa in combination with the plethora of risks on the ground lead to the conclusion that doing dairy business becomes a matter of navigating uncertainty. The focal decision to which this thesis report provides supports is: *'To invest or not to invest in dairy business development in Sub-Saharan Africa and if so, where and how?'*. The second half of this focal decision – at the same time main research question – refers to the selection of countries put under closer review (see figure 1) and the assumed spectrum of available options for business development (see paragraph 1.4). While investments can be made tomorrow, planning for success requires taking the long view. Therefore, the temporal scope of this research project is the medium-long term until 2030.

Figure 3 - Pyramid of Corporate Social Responsibility (Carroll, 1991)

It should be noted that this focal decision is directly linked to fulfilment of the prime economic responsibility of making profit. As becomes clear from the Carroll's (1991) pyramid of corporate social responsibility, this is merely the foundation that undergirds all else. Different types of responsibility may be in a constant tension with one another, which could render the answer to the focal decision overly complicated or ambiguous to prove actionable. Therefore, the scope of research is limited to decision support from the ulterior motive of fulfilling the economic responsibility. Paragraph 10.1 critically reflects on this choice regarding scope.

A systematic approach has been adopted so as to arrive at business development strategies that match the level of uncertainty associated with African dairy. Table 1 provides and overview.

Table 1 - Research questions

RESEARCH QUESTION	OUTPUT
Unravelling the complexity of dairy business in Africa	
[1] What is exactly the business challenge?	Thorough and in-depth understanding of business challenge
Capturing formal trade flows of today	
[2] What are the direction and size of trade flows in dairy products?	Map of African dairy trade patterns
Clarifying system behaviour	
[3] How does dairy business develop in Sub-Saharan Africa?	Systems diagram
Drawing up future scenarios	
[4] What macro-environmental trends affect the success of business development?	
[5] Which driving forces in the contextual environment are top-ranked in terms of importance and uncertainty?	
[6] What are plausible dairy futures an investor might face?	Scenarios
Formulating decision support for investment in African dairy business	
[7] What are the implications of future scenarios for investing in dairy business development across the Sub-Saharan African countries under consideration?	Strategy guide Investment plan Banking opportunities

2. METHODOLOGICAL APPROACH

The majority of those with intentions to invest in African dairy is paralyzed in the decision-making process. They are facing uncertainty. In spite of this profound and partially irreducible uncertainty, decisions have to be made. Three distinct methodological approaches have been applied to reduce uncertainties to a level that allows for answering the main research question (see paragraph 1.5) and to help navigate uncertainty insofar irreducible. These methodological approaches as implemented and their limitations are outlined in the subsequent paragraphs. The concluding paragraph of this chapter describes the synthesis of partial analysis so as to arrive at a comprehensive answer.

2.1 TRADE MAPPING

African dairy trade is clouded in uncertainty. Over the past years, however, statistical trade data have become more widely available and improved in terms of quality (WTO, 2012). This opens up the way for removing the cloud. For investigating dairy trade patterns, a systematic approach has been developed in-house by the FAR department.

2.1.1 Description of methodology

Methodologically, focus has been on mapping trade volumes rather than values. Bearing in mind the variety of dairy products that can be processed out of raw milk, these volumes have been converted into so-called Liquid Milk Equivalents (MEQ) in order to better understand the actual geographical patterns linking up production and consumption. In doing so, the "combined butterfat and non-fat solid contents method" for conversion has been relied upon.
The essence of this conversion method boils down to the following formula (Richarts & Mikkelsen 1996):

$$\frac{amount_{FP} \times fat\ content_{FP}}{fat\ content\ of\ whole\ milk} + (amount_{FP} \times skimmilk\ factor_{FP})$$

which equals:

$$amount_{FP} \times (milkfat\ equivalent + skimmilk\ equivalent)$$

in which

$$FP = final\ product$$

2.1.2 Methodological justification

The first crucial methodological assumption implicit to Rabobank's approach to dairy trade mapping is the choice for volumes over values. This can be justified by the objective of the trade mapping exercise. After all, it should yield insight into the size of the dairy market in Sub-Saharan Africa rather than into how trade patterns shifts with global commodity price volatility.
Secondly, given the variety of MEQ conversion methods available and around in the dairy industry, the choice for the combined butterfat and non-fat solid contents method deserves some clarification. Following a critical review of the conversion methods used, Richarts & Mikkelsen (1996) have concluded that the butterfat method and the non-fat solids content method in particular are based on extreme positions, and so provide biased results. The tradition of using the butterfat method comes from the times when this part of the milk determined most of its values. Yet, inaccuracies arise from (a) the fact that is relies upon standards values while average butterfat content vary over time and geographically, and (b) it neglects the role played by other raw milk components in the valorisation process. Apart from these inaccuracies, the overall return on raw milk is nowadays no longer predominantly determined by the fat-content on the milk. The main

argument favouring the non-fat solids content method has thus been that the non-fat part of the milk contributes more than the fat-content in most parts of the world. Again, one ends up with ignorance of the value added by the fat contained in raw milk.
To overcome these disadvantage Richarts & Mikkelsen (1996) proposed the so-called combined butterfat and non-fat solid contents method, which subsequently turned into the main recommendation by the International Dairy Federation too. Given that this approach has been adhered to before by FAR, it will ease correct interpretation of information presented to clients.

2.1.3 Outline of methodological approach and implementation

The methodological steps followed to arrive at map of African dairy trade patterns are showed in figure 4. Insofar these steps encompass relevant implications for the research product or have been associated with practical difficulties, further explanation of their implementation is provided.

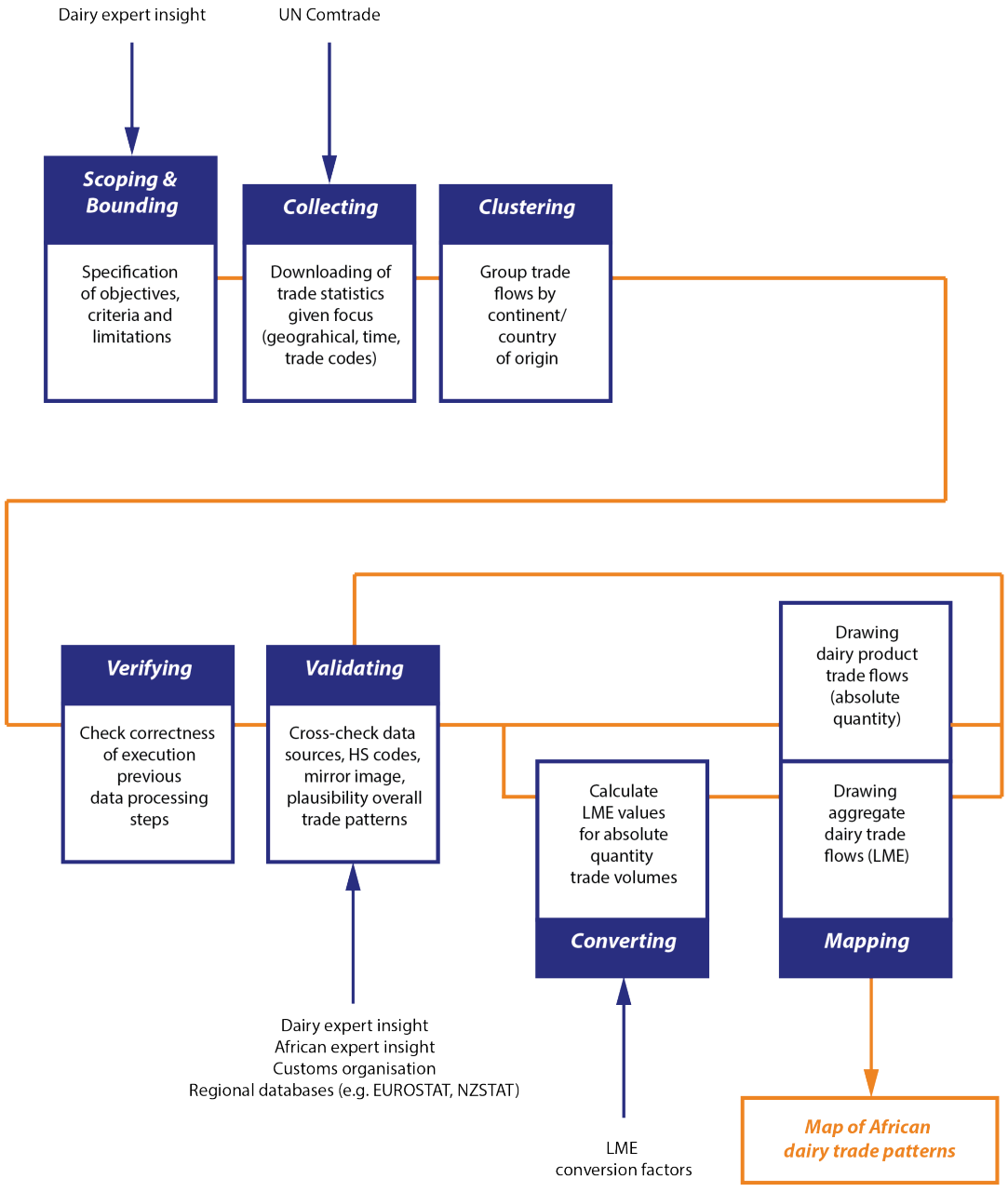


Figure 4 - Methodological steps trade mapping

2.1.3.1 Scoping and bounding

In terms of *scope*, this research phase aims to meet the objective of arriving at better insight of dairy trade flows to and across the African continent. Successful achievement of this objective implies that generated insight is as close as possible to the actual trade patterns of today, complete and undistorted while allowing for easy and correct interpretation. From this follows the decision not to use 2014 statistics, as they might yet be incomplete and generally remain subject to change into at least the first half of the following year. Moreover, the Ebola-crisis, which was at its height during 2014, has been associated with severe distortion of trade (Matthew Johnson, personal communication, n.d.). In line with the assumption that this distortion also affected dairy trade, the statistics of one year earlier, i.e. 2013, formed the input for the African dairy map. In order to easy interpretation, the number of trade flows depicted in the map should be limited. This implies the need for grouping flows together (see paragraph 2.1.3.3). With regards to *bounding*, an important limitation of the trade mapping efforts is that the level of detail is dependent on harmonization of administrative labels placed upon imports and exports. Globally, the Harmonized System (HS) of the World Trade Organization goes as far as 6-digit level. More detailed classifications up to 10 or 12 digits are available, but these differ across countries and/or unions.

2.1.3.2 Collecting

For the actual volumes traded, one can rely upon figures as reported by importing country, on figures as reported by the exporting country, or on both. Table 2 provides an overview of methodological choices made in that regard. It should be noted that the level of intra-African trade very low and over the last decade growing at a slower rate than world trade volumes (UNCTAD 2013). Furthermore, the aggregate dairy flow into Africa is yet close to 8 times bigger than the aggregate dairy export flow out of the continent.

Table 2 - Trade flow reporters relied upon

TYPE OF FLOW	RELIANCE ON	AS REPORTED BY
Into African continent	Export figures	Non-African countries
Across African continent	Export figures *(primarily)*	African countries
Out of African continent	Import figures	Non-African countries

The size of all trade flows coming into and going out of the African continent equals the (converted) quantity as reported by non-African partner in the transaction because of the statistical tragedy in Africa, as declared by Jerven and Johnston (2015). Jerven (2015) sharply criticizes the tendency among influential economist to place too much trust in African data and draw misleading conclusions. One of the reasons for unreliability, as stressed by *an external client* (personal communication, 28 April 2015) is that trade figures of African countries are frequently subject to corrupt customs invoicing practices.

For intra-African trade flows, however, this is not an option. The assumption that trade corruption is occurring predominantly at the moment of payment associated with entrance, import figures are likely to be less accurate than export figures. Although also export figures may be subject to some sort of optimism bias added by local government, a closer look at the biggest exporters of dairy within Africa are the more developed and stable countries, thereby adding further justification to the reliance on export figures. Dubious export flows across the African continent have nevertheless been subject to expert validation and adjusted in size towards the reported counter flow where necessary (see paragraph 2.1.3.5).

2.1.3.3 Clustering

To arrive at a still comprehensible aggregate trade pattern, separate trade flows have been grouped by point of origin rather than destination. This is in line with the underlying objective of generating detailed insight into African dairy consumption – where the milk is flowing to – as opposed to better understanding of export behaviour of those with a production surplus.

2.1.3.4 Converting

Converting absolute quantities to MEQ creates the opportunity for adding up trade flows in different dairy commodities, which then reveals the aggregate trade pattern. Table 3 provides an overview of the HS codes covered in the trade map and the corresponding MEQ conversion factors following from the combined butterfat and non-fat solid contents method (see paragraph 2.1.1 and 2.1.2).

It should be noted that trade flows in infant formula have not been included in the aggregate trade pattern. The reason is twofold. First, there is no globally harmonized 6-digit code that allows for consistently distinguishing infant *milk* formula (IMF) from infant formula. Second, the recipes of IMF products are continuously changing. This means that the actual code attached to IMF exports may vary over time as well as from trader to trader. Furthermore, due the substantial non-dairy content in IMF products, the complexity of product composition implies the need for changing LME conversion factors along with IMF recipe. Therefore, trade in IMF will yield merely product maps with flows representing absolute quantities.

Table 3 - Dairy commodities considered

HS CODE	DESCRIPTION	MEQ CONVERSION FACTOR
0401	Liquid milk	1.0
040210	Skimmed milk powder, fat < 1.5%	10.9
040221	Whole milk or full cream powder, unsweetened, fat > 1.5%	8.3
040229	Whole milk or full cream powder, sweetened, fat > 1.5%	2.1
040291	Concentrated milk or cream, unsweetened (i.e. evaporated milk)	2.1
040299	Concentrated milk or cream, sweetened (i.e. condensed milk)	2.1
0403	Fermented/sour milk products	1
0404	Whey	1
0405	Butter and butter oil	1
0406	Cheese	8.3
190110	Infant formula	n/a
19019099	Fat-filled milk powders	5.4
350110	Casein	33
350190	Caseinates	33

2.1.3.5 Validating

Several steps have been undertaken to assure that maps drawn up adequately represent actual dairy trade behaviour, thereby fulfilling the intended purpose of providing insight into the actual size of the Sub-Saharan Africa market. The most important steps were:

- Check whether data extracted from UN Comtrade and Global Trade Atlas (GTIS) resemble trade quantities as registered in the major exporter's databases (EUROSTAT, NZ Stat)
- Checking implausibly large arrows – for example those dairy flowing into Mozambique and Mauritius and cheese trade flows from North Africa to Madagascar – against the expertise of *an external client* (personal communication, 28 April 2015) and parties located on the ground in Mozambique (personal communication, 26 March 2015).
- Checking with FAR analysts, the Dutch customs authority (personal communication, 8 April 2015) and *an external client* (personal communication, 10 April 2015) whether the right trade codes had been selected from the HS taxonomy.
    - The only commodity giving rise to uncertainty as to what trade code to rely upon has been IMF. While the Dutch customs authority suggested IMF should be traded under HS code 04022911 (i.e. special milk for infants for infants, in solid forms, sweetened, of a fat content by weight of > 10% but <= 27%, in hermetically sealed containers of <= 500g), FrieslandCampina explained that their IMF products actually crossed the European border with another label attached to it. Because of the substantial non-dairy content of these products (see paragraph 2.1.3.4), IMF no longer belongs to trade product group dairy (04).
- Checking whether the map appears to be complete in the eyes of *two external clients* (personal communication, 28 April 2015 / 6 May 2015).

- Commodity traders expressed the expectation that FFMP – despite its insignificance on the global market – made up an important share of exports into West Africa. Although global FFMP trade levels are comparatively low, the importance for the African dairy market proved to be substantial. Thus, this validation step led to the adjustment of the scope so as to include HS code 19019099.

2.1.4 Statistical material and data-analytical tools

Official statistical material served as the input for constructing the African dairy trade map. Consultation of FAR analyst Matthew Johnson resulted in the decision to primarily rely upon the UN Comtrade, as this database is most complete if it comes to African trade statistics. GTIS served gap-filling purposes whenever the 6-digit level was insufficiently precise to filter trade in niche product or commodity.
Excel spreadsheets and add-in data analytical tools have been used for two practical reasons: (a) downloads from the above databases appear as spreadsheets, and (b) it eases up communication with fellow FAR analysts.

2.1.5 Methodological risks and limitations

In a perfect world, country A reported imports from country B would match with country B reported exports to country A. Consequently, this would make mirroring – i.e. using information from the partner when a country does not report its trade – a transparent and error-free process. There are a couple of reasons, though, why this in not the case (Amjadi et al. 2011). First of all,

- Despite all efforts made by national and international agencies, data quality may vary among countries
- For a given country, imports are usually recorded with more accuracy than exports because imports generally generate tariff revenues while exports do not
- At a detailed level, the very same good may be recorded in different categories by the exporter and the importer

Particularly the first two reasons, in combination with the decision to rely on trade figures reported by non-African countries insofar possible, deserve special attention. It should be acknowledged that the decision has been motivated by data quality problems, which do not necessarily apply to all African governments. To prevent from arbitrariness, the accuracy of the statistics of the trade partners – of which the vast majority is OECD countries in the case of dairy – has been assumed good enough for arrival upon a picture close to reality.
The third reason reveals an important limitation to the trade mapping exercise. Given that the HS system is limited to the 6-digit level, statistics of trade in specific products (e.g. IMF) cannot be consistently gathered and processed. It highlights the importance of further harmonization and standardization of trade reporting on a global scale so as to increase transparency. For this research project, the lack of it implies that only broad insight into the African destinations of baby food can be obtained. Consequently, IMF has been omitted in the aggregate dairy trade patterns. However, the total volume of baby food traded with Africa reveals that would result in at most a 1% upward adjustment.

Lastly, interpretation risks exist. The constructed worldview of African dairy trade for 2013 is never exhaustive. After all, the informal trade so vibrant in Africa goes unregistered and is therefore not included in the maps. Moreover, powdered milk imports cannot be directly related to the existence of a consumer market for powder sachets. These commodities serve as input for reconstitution activities too.

2.2 Strategy Analysis of Multi-Actor Systems

The preceding chapter already reveals that African dairy business presents an inherently and profoundly complex. The theoretical basis for analysing and structuring it has been borrowed from

the book *Policy Analysis of Multi-Actor Systems* of Enserink et al. (2010). Although written to guide policy analysts, it provides the basic tools that are equally helpful to strategy analysts. The content of paragraphs 2.2.1 to 2.2.4 are predominantly based on Enserink et al. (2010).

2.2.1 Description of methodology

The approach comprises a range of analysis methods and techniques that allow for systematic problem exploration. By analysing and structuring the parts of a problem, the actors involved in it and the future in which the solution will be realized, the approach is closest to a 'rational' style of strategy analysis.

2.2.2 Methodological justification

The challenge of African dairy business faced by the corporate decision-maker is characterized by the presence of many different actors. They hold conflicting interests, objectives, and perceptions of how demand for dairy should be fulfilled. Moreover, all of them act strategically to get the best out of sector development. The methodological approach of Enserink et al. (2010) provides decision-making support and further insight into how to make these strategic decisions ultimately work for success.

2.2.3 Outline of methodological approach and implementation

The methodological steps followed to arrive at thorough understanding of why African dairy business development is perceived as a challenge and a systems diagram are showed in figure 5. Hereafter, further explanation is provided regarding implementation for this specific case study.

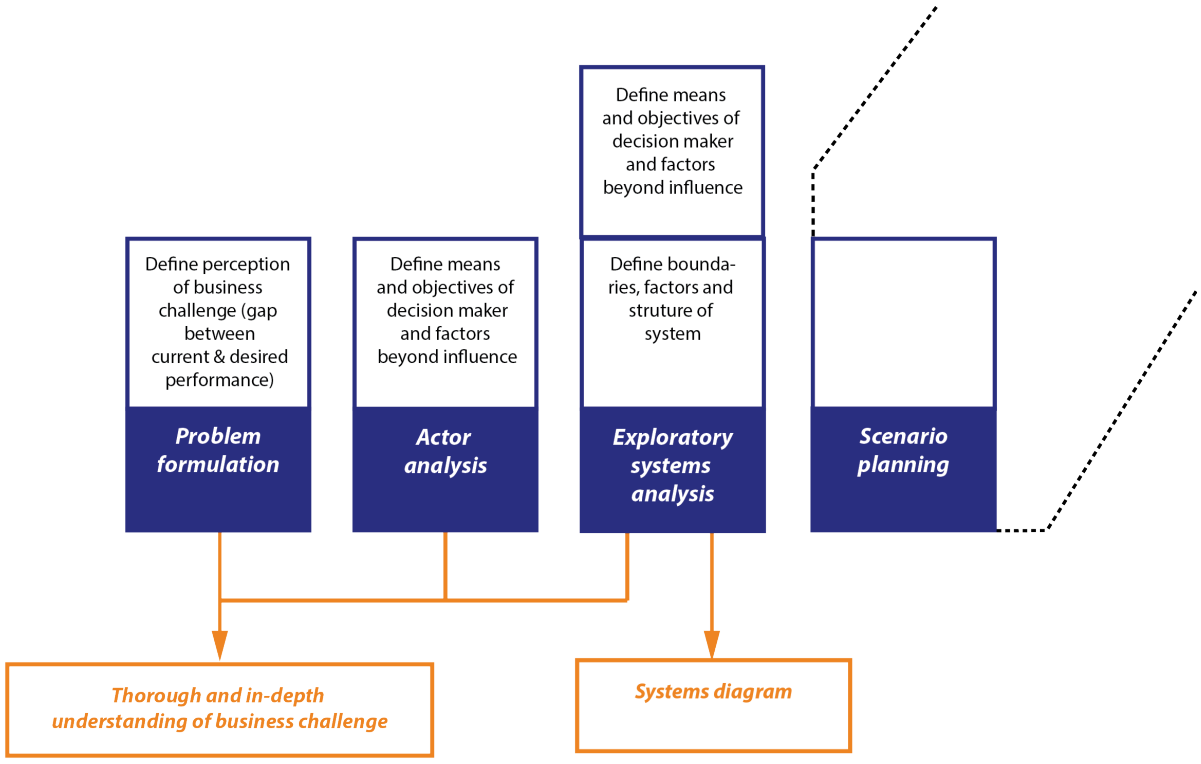


Figure 5 - Methodological steps strategy analysis of multi-actor systems

2.2.3.1 Problem Formulation in Complex Environments

Ill-structured problems demand that the analyst first take an active part in defining the nature of the problem itself (Dunn, 1981). How does the decision-maker perceive the challenge of African dairy business? In what dimensions does the current landscape diverge from the desired landscape and the company's position therein? Understanding the perceived gap is the crucial first step to eventually coming up with decision support.

2.2.3.2 Actor Analysis

The sector of study involves multiple actors. No individual single actor will be able to unilaterally impose its desired African dairy future. The actors operating in, regulating and or buying from the market are interdependent. Awareness of the interests and objectives of other actors is crucial to success. For example, if local government aim to increase the rates of exclusive breastfeeding among their population, this could conflict with the objective of foreign companies that target increasing sales of IMF.

Thus, actor analysis comes in helpful for increasing the chance of successful business development. The problem formulation (see paragraph 2.2.3.1) serves as the point of departure. After a list of actors involved is drawn up, formal interrelationships are mapped. A systematic comparison is made of each actor's interests, objectives and problem perceptions, causes and solutions. Based on their resources and dedication to contributing to dairy sector development, actor dependencies are classified.

2.2.3.3 Exploratory Systems Analysis

Conceptual modelling, a framework for Systems Analysis, is generally applied to overcome the complexity of large-scale socio-technical systems as is the landscape of African trade. The method is characterized as a structured way of working that is open and explicit, empirically based, consistent with existing knowledge, and for which the results are verifiable and reproducible (Walker 2000). A system diagram has been drawn up that clarifies the system by defining its boundaries and defining it structure. This diagram is actor-specific, as it describes the part of the real Sub-Saharan African dairy sector that is being studied from the viewpoint of the foreign business developer.

The conceptual framework (see figure 6) involves some core concepts. The desired situation is generally described in terms of *objectives*, of which the realization is measured through the use of *criteria*. These are linked to the main interest of the corporate decision-maker, i.e. economic performance. Available options for business development (see paragraph 1.4) constitute the *means* on the left side of the diagram. Finally there are some *external factors* beyond control of the decision-maker that however do place important limitations of constraints on the behaviour and outcome of the system.

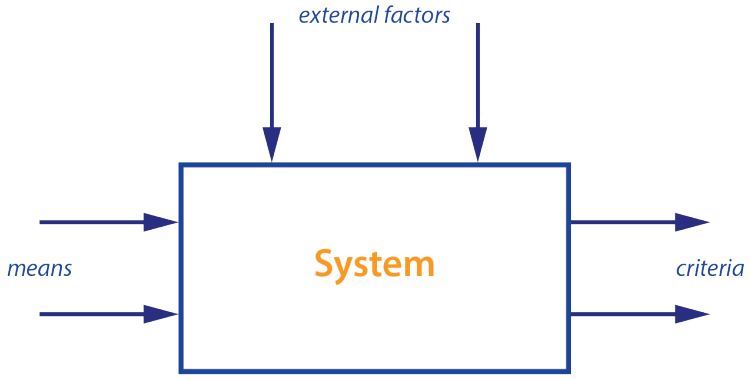


Figure 6 - System diagram: conceptual framework for systems analysis (Enserink et al., 2010)

2.2.3.4 Exploring the Future: Scenario Planning

As has become apparent in paragraph 1.4, the plethora of external factors affecting the success implies that doing dairy business in Africa is all about navigating uncertainty. Therefore, the future will be extensively explored. Whereas means and criteria are already well known to the corporate decision-maker, external factors and the dynamics they induce in the 'black box' of African dairy are not. The steps taken for generating insight into contextual scenarios are outlined in paragraph 2.3.

2.2.4 Reflection – risk and limitations

The power of this approach is as high as the sum of its underlying analytical techniques. Each of the partial analyses has its own risks and limitations. Actor analysis provides a static picture of problem perceptions and interdependencies that in reality change over time. In the case of African dairy, characterized by a high degree of opportunism and behavioural unpredictability, this change is extremely rapid. The inventory of actors involved is all but stable or known. Someone who was a rice trader the other day may be a dairy trader tomorrow. Mozambique might be split into two separate nations, each with its own public policy objectives and resources. A second shortcoming lies with the art of generalizing. For the sake of feasibility, one would need to analyse general categories of actors, rather than actually existing country-specific actors. Consequently, one again ends up with the tendency to evaluate Africa as being "one big country". Notwithstanding that is follows from the need for manageability rather than ignorance, the implication is the same. It deteriorates the investments decision support due to inference of risks factually associated with neighbouring countries (Asiedu, 2002). Therefore, the decision-making requires iterations. Risks should be assessed at a later stage of investment planning at the suitable country level.

2.3 SCENARIO PLANNING

The future is uncertain. As stressed by Enserink et al. (2010), it is not possible to predict the future accurately, but at the same time exploration of the future is extremely relevant because most of our actions are aimed at what lies ahead. Predictions are attempts to make absolute statements about the future. Explorations are judgments about plausible futures. This paragraph outlines the scenario approaches relied upon to explore African dairy futures.

2.3.1 Description of methodology

This systematic approach to exploration of the future results in scenarios. Herman Kahn, founding father of scenario planning, defines scenarios as a set of hypothetical events set in the future constructed to clarify a possible chain of causal events as well as their decision points (1967). Scenario planning presents all complex elements together into a coherent, systematic, comprehensive and plausible manner (Coates 2000). In this overall picture of the environment, interactions among several trends and future events are highlighted (Martino 2003).

2.3.2 Methodological justification

Scenarios are considered a valuable tool that helps organizations to prepare for possible eventualities, and make them more flexible and more innovative (Hiltunen, 2009). They help to overcome thinking limitations (Amer et al. 2013) and is therefore particularly useful in times of uncertainty and complexity (Schoemaker 1991).
As explained earlier, the international dairy market is facing great uncertainty, of which high price volatility observed from 2007 onwards is a strong sign. Add to that African market characteristics and on-going efforts aimed at trade liberalization and trade facilitation and it becomes even more uncertain how the future unfolds. How to arrive at successful market access strategy or investment decision? Scenario planning, originally developed within Royal/Dutch Shell (Van Der Heijden 1996) provides a systematic way out. The point is not to pick one preferred future and hope for it to come to pass, nor to find the most probable future and adapt to it. The point is to make strategic decisions that will be sound for all plausible futures (Schwartz 1991). Although it may not guarantee success, being ready for whatever future takes place and being able to influence it is a crucial part of the story.

Rather than a single approach, there are several methodologies for scenarios with many common features (Coates 2000; Huss 1988; Bradfield et al. 2005; Varum & Melo 2010). Amer et al. (2013) distinguish three schools of techniques or major approaches, which are: (1) intuitive logics, (2) probabilistic modified trends (PMT) methodology and (3) the French approach of La prospective. This research project followed the first approach while relying primarily on the scenario

development models of Schwartz (1991) and, to a lesser extent, of van Der Heijden (1996), both thought leaders belonging to the intuitive logics school.

Why is the methodological school that received most attention in the scenario planning literature preferred over the other two schools for the African dairy case? First of all, the intuitive logic approach assumes that business decisions are based on a complex set of relationships among the economic, political, technological, social, resource, and environmental factors (Huss & Honton 1987). It allows for dealing with the very presence of those environmental factors are not precise, quantitative and predictable, but rather imprecise, qualitative and hard to predict (Huss 1988). The PMT school, on the other hand, aims to strengthen traditional forecasting techniques such as time series analysis by taking into account the effect of unprecedented future events (Chermack et al. 2001; Bradfield et al. 2005; Huss & Honton 1987). Although the quantitative techniques involved may be promising in some cases, the added value is limited for this research project due to data quality limitations following from the geographical focus on Sub-Saharan Africa. Data is often unavailable or inaccessible, as confirmed in an interview with Jan van der Lee (personal communication, 24 February 2015). If available, data may be incomplete or incorrect due to severe upward or downward bias depending on publishing authority. Fellow Africa analyst Sierk Plaat (personal communication, n.d.) frequently illustrates these biases by the example of rice production figures presented during a congress in East Africa, where the amount of the local ministry of agriculture was double the amount indicated by development aid agencies. Jerven (2015), the criticist proclaiming a statistical tragedy in Africa, equally dislikes placing too much trust data on Africa published by acknowledged international organizations, who still indirectly rely on African authorities' barely institutionalized practice of collecting, sharing and updating economic data. Estimates vary wildly. For instance, GDP growth in 2014 in South Sudan was either 5% or 36%, depending on whether one believes the IMF of the World Bank (the Economist, 2015).

Provided that quantitative scenario planning techniques would be a mismatch with the quality of data quality on the economy and dairy sector of Africa, the resulting choice was among qualitative methodologies. French scenarios resulting from the approach of La prospective, due to their great flexibility and more general meaning (Durand 1972) are more often used for public sector planning than corporate level planning (Bradfield et al. 2005) and usually scope of scenario work is narrowly focused (Durand 1972). In conclusion, the intuitive logics school is better suited to the corporate macro-perspective required for steering business development towards success.

2.3.3 Outline of methodological approach and implementation

While adhering the intuitive logics school, the step-by-step of approach of Schwartz (1991) served as the guideline to scenario planning. The starting point is the focal decision *'Whether or not to invest in dairy business development in Sub-Saharan Africa - and if so, where and how?*'. Subsequently, the process gradually builds out to the environment. In building out, the exploratory systems analyses conducted earlier (see paragraph 2.2.3.3) proves of added value. From the systems diagram (see appendix D.3) of the 'black box' of African dairy, those key factors that influence success of failure of the focal decision can easily identified.

The steps in figure 7 are derived from Schwartz and assumed self-explanatory from the figure. Instead, the focus of will be on adjustments made to the approach so as to better match the research setting. The uniqueness of implementation boils down to the cross-organizational set up, characterized by iteration and a leading role for the scenario planner, and implications of the absence of a scenario team.

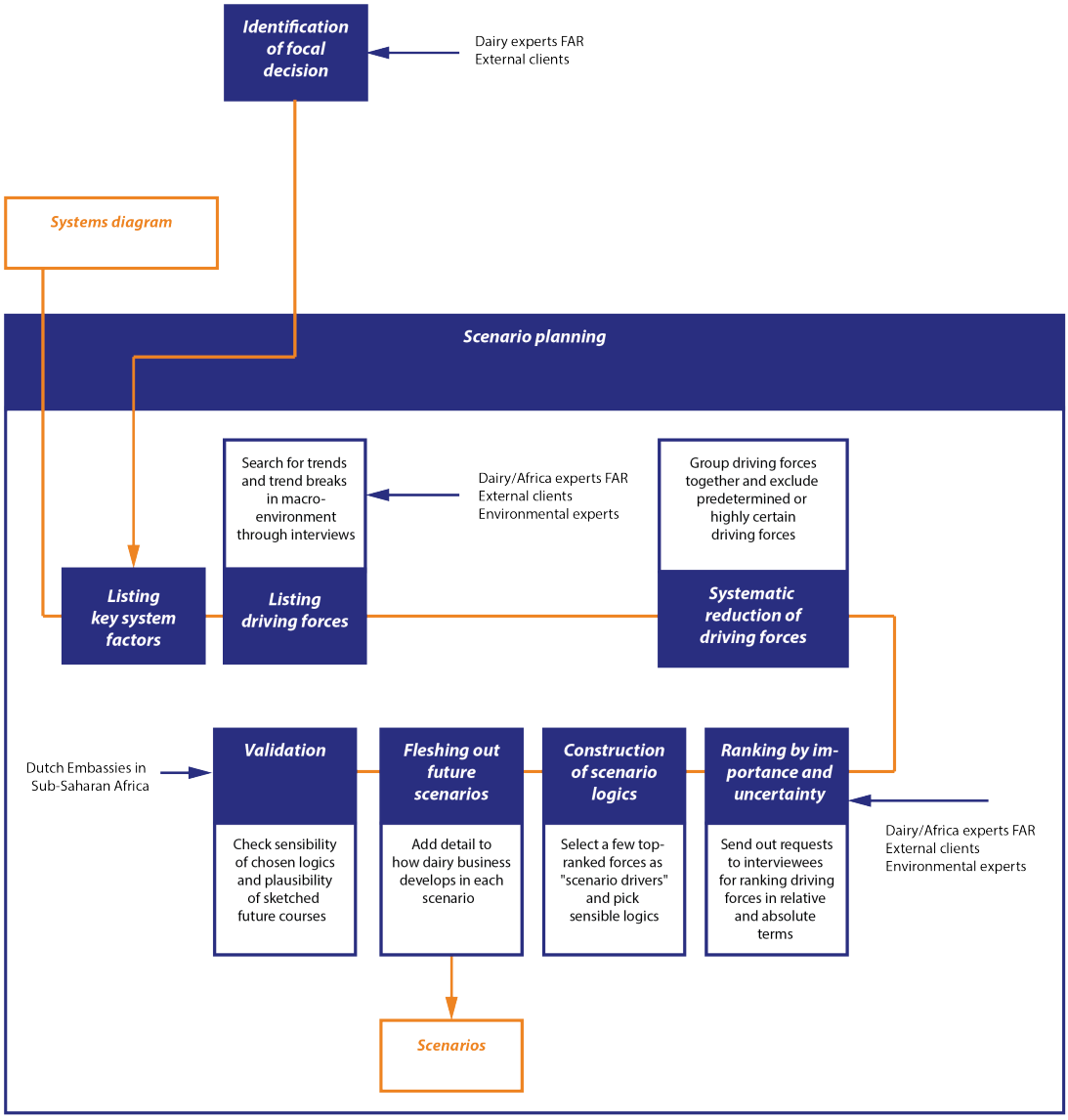


Figure 7 - Methodological steps scenario planning

2.3.3.1 Cross-organizational set up

As stressed by Kahn and Wiener (1967), it is preferable to stay with value-neutral external scenarios. It can help decision-makers to stretch beyond their conventional map. Therefore, they should be kept away from the daily "playing field". In other words, we must distinguish the organisation itself, where the strategist has control, from its *transactional* environment, that part of the world over which the strategist has influence. This world is in turn part of the *contextual* environment, where the control of the strategist is insignificant (Van Der Heijden 1996). Figure 8 illustrates the distinction, as well as the driving factors mentioned earlier and the relative position of those involved.

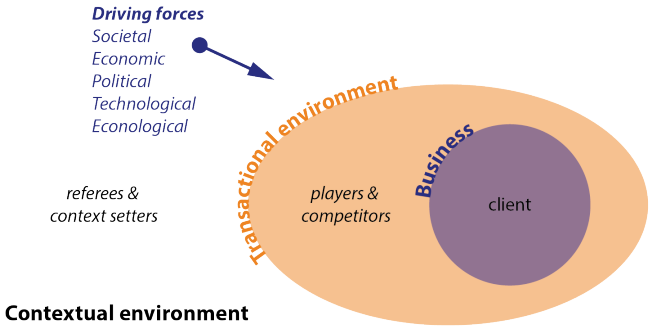


Figure 8 - Dairy business and the environment, based on van der Heijden (1996)

According to Amer et al. (2013), in case of the intuitive logics methodology, scenarios are usually developed by a team *internal* to the organization. The role of external parties – which Rabobank as a financial service provider to African dairy essentially is – is generally not leading, but limited to facilitation and design of practical aspects of the scenario process or providing an expert view on developments in the contextual environment. The set up of this African dairy case study is different and needs to be aligned to the interest of the commissioner of the assignment, i.e. the FAR department of Rabobank International. This department takes up the role of knowledge provider to the bank and external clients. Understanding the environment in which clients operate is considered key to their positioning of relationship banker of the global F&A sector. The analytical results of FAR are usually translated into advice for internal customers – departments in need for a factual basis to justify their investment and financial service decisions – and research reports and world trade maps provided to external clients and sometimes the public. In conclusion, research efforts are not undertaken directly with the organization that develops dairy business. Consequently, research occurs across rather than within organizational boundaries (see figure 9).

Figure 9 includes a couple of terms that deserve further explanation. *Internal client* refers to may be either departments of the global F&A bank – TCF, EF, and M&A in particular – or local African partner banks. *Dairy company* refers to any market player with substantial dairy turnover. It may be concluded that through granting (access to) capital, internal clients are stakeholder in the business development of dairy companies and traders. Rabobank aims to proactively act upon the banking opportunities following from the provision investment decision support to external clients. These *banking opportunities* also comprise financial service provision to other stakeholders in the transactional environment of dairy business development such as supplier of farm inputs or processing equipment.

2.3.3.2 Implications cross-organizational set up

What are the implications of this cross-organizational set up, apart from leading role assigned to the scenario planner? It implies that steps are followed in an iterative manner. Therefore, some of Schwartz' (1991) steps had to be adjusted because of the iteration and particularly the absence of a scenario team. There is a need for building in an additional step to systematically reduce the number of driving forces due to the lack of convergence in participant perspectives, which usually occurs in a team setting. Moreover, given that ranking can only be initiated once a limited number of driving forces has been selected – to prevent from the ranking procedure becoming a cognitive challenge – there is a need for a ranking procedure that accommodates for collecting the still divergent view of participants scattered across the globe. Third, the leading role for the scenario planner needs to be balanced by a third party capable of evaluating research outcomes. How these three core alterations to the scenario approach have been implemented is explained hereafter.

<u>Systematic reduction of driving forces</u>

So-called driving forces, i.e. macro-environmental external factors that influence the key system variables, identified during interviews were plenty in number. Due to conducting interviews of an as much as possible of an open-ended nature (van der Heijden, 1996), trends and trend breaks mentioned during the one interview may be closely related to those mentioned during another, possibly under another label. Moreover, due to the application of the September formula (Van Der Heijden 1996), which ensures consideration of social, economic, political, technological and environmental aspects, the list of driving forces was too long to be subjected to ranking. In other words, trends and trend breaks mentioned had to be grouped together into *key* driving forces. Appendix F.1 illustrates this step. Some driving forces may appear to be missing. This is because some of the forces are predetermined or highly certain (e.g. demographics), therefore unlikely to become scenario drivers. Given that the complexity of ranking grows with the number of driving forces to be considered, these predetermined or highly certain forces have been left out of account.

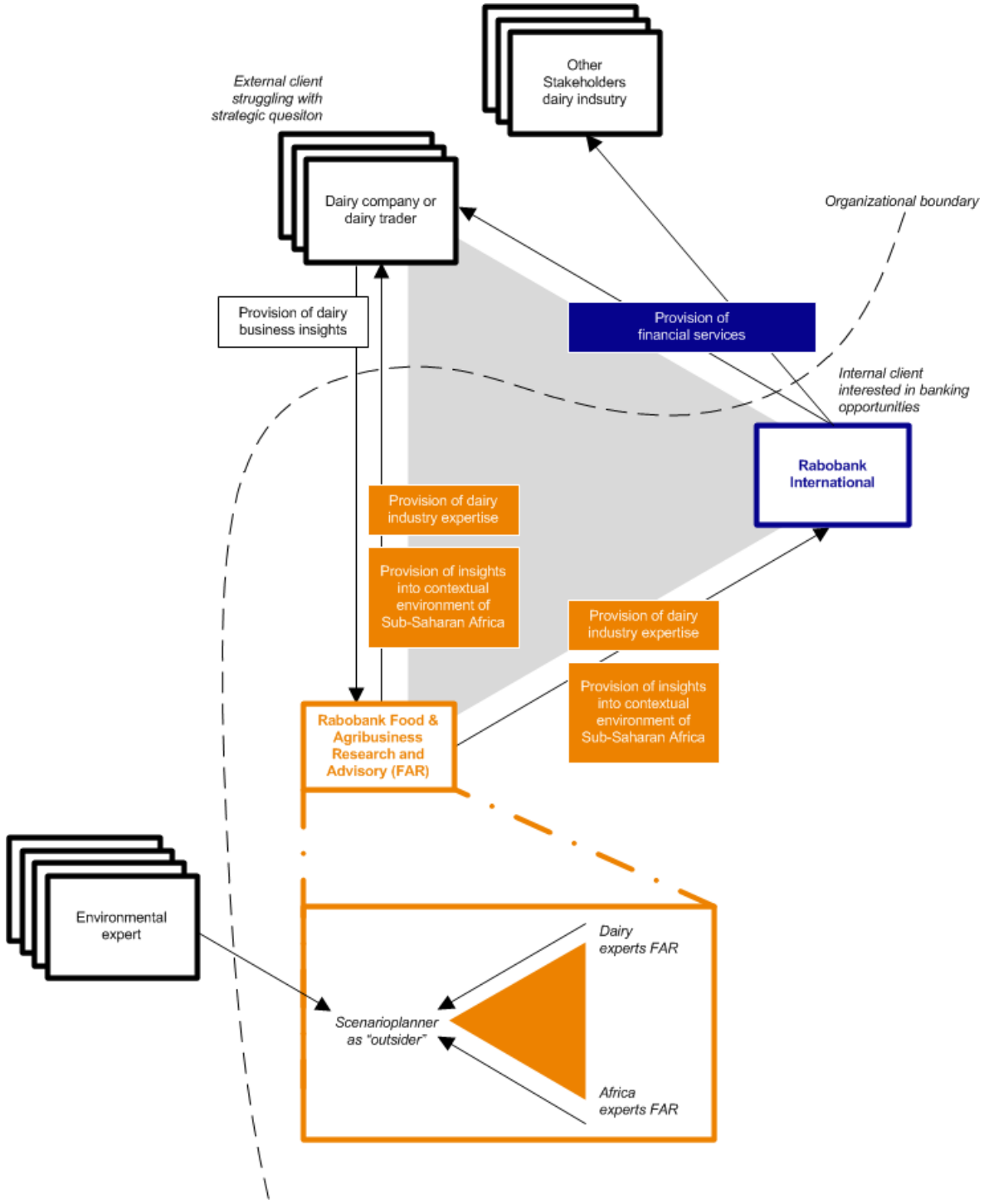


Figure 9 - Set up scenario planning across organizational boundaries

Ranking procedure

The ranking procedure presents a further deviation from Schwartz' approach. Due to the absence of a scenario team, request for ranking had to be sent out electronically to internal and external clients and environmental experts with whom an open-ended interview had been conducted. The request as sent out to participants following the respective call or appointment can be found in appendix F.2. The ranking table in the request has been assumed to be self-explanatory but participants were free to contact the scenario planner to ask for further explanation or guidance for filling out the table.

Compared to Schwartz (1991) and van der Heijden (1996), a key difference of the ranking procedure lies with asking participants to provide, for both impact and uncertainty, their

evaluation in both relative *and* absolute terms. The reason for it is twofold. First of all, by stepping away from mere ranking, this procedure theoretically could allow for increasing awareness of the inherent variability associated with the African continent. Even the driving force that becomes bottom-ranked (8th), might be associated with high uncertainty and high impact. Second, it provides an incentive for participants to ensure consistency between the two rankings – i.e. the driving forces ranked 1st or 2nd should correspond with an at least as high absolute classification as bottom-ranked driving forces fall into - a possibility for the scenario planner to check this consistency. Unfortunately, some key issues arose (see paragraph 9.1) that prevented the ranking procedure from fully delivering the intended benefits.

For the sake of privacy, the responses of individual participants have been anonymized. The group of participants from which the aggregate ranking has been constructed includes people with direct interest in business development:

- Financial service providers (with expertise on both Africa and dairy) of Rabobank International as well as African partner banks
- Dairy business, both commodity trading as well as multinational production and processing

… as well as environmental experts located in the business environment or providing support/ knowledge to the sector. Respondents of this category cover expertise in the field of:

- Legal and policy aspects related to dairy exports from the EU
- Customs affairs and trade facilitation, from both corporate and government perspective
- Global transportation, both international shipping and inland logistics
- Development aid in the African dairy sector
- Livestock production systems research

Validation

The use of scenarios implies making assumptions that are, in most cases, not verifiable (Walker et al. 2003). However, scenarios should make sense to the decision-maker to be put to work. Usually, the scenario team is satisfied if constructed scenarios are both plausible and surprising. Due to the cross-organizational set up, therefore absence of a scenario team, another mechanism for validation has been followed. To assure that both chosen scenario logics as well as implications feeding into decision support ultimately derived from the scenarios make sense, a number of Dutch Embassies in Africa (see appendix H) has been reached out to. During these conference calls, the backbone of the scenarios has been checked for coherence and comprehensiveness. Apart from discussion of the country-by-country strategy guide (see paragraph 2.4.1.2), the focus during these telephone calls has been on the selection of scenario drivers, the assumption regarding the range over which each scenario driver varies and the identified location of scenarios relative to the three axes. After all, as stressed by Schwartz (1991), the challenge is identifying a plot that best captures the dynamics of the situation and allows for communicating the points effectively. Particularly because of the leading role for the individual scenario planner in the cross-organizational research set up, this validation step before weaving the pieces together in the form a narrative is quintessential.

2.3.4 Methodological risk and limitations

The intuitive logical scenario planning technique relies strongly on the knowledge, commitment, credibility and communication skills of the scenario team members (Huss 1988). Notwithstanding the iteration built into the cross-organizational set up reduces risks with regard to the knowledge requirement, participants invited because of their on-the-ground experiences may not be willing to share their insights with to FAR. They might fear the dissemination of the experiences, a resource adding to their competitive advantage, to potential new entrants. Reassurance of the common practice of FAR analysts to share merely macro level knowledge rather and no specific clients experiences should dispel this threat.

Moreover, it should be noted that the coverage of ten different countries in Sub-Saharan Africa renders the construction of *equally* plausible scenarios impossible. It is nevertheless important to ensure that the constructed scenarios are not implausible for a specific country. Differences in plausibility for each of the scenarios are highlighted in paragraph 6.1.
Lastly, Schwartz (1991) stresses that exists an interpretation risk to the frequent tendency of ending up with three scenarios. Participants will be tempted to identify on the three as the "middle" or "most likely" stories. Hence, they might treat it as a forecast such that all methodological advantages are lost. The point here is not to pick scenarios that could constitute a straight line across the three-dimensional scenario grid. In addition, a word of caution should be presented in the continuous dialogue with clients. Discussion of differences in plausibility at the same time decrease the likelihood that one scenario would be interpreted as "most likely".

2.4 SYNTHESIS – DECISION SUPPORT

Integration of partial analyses acts as a precursor to the design of a meaningful investment plan. The methodologies described in the previous paragraphs yield a map of African dairy trade patterns, a systems diagram and scenarios. From these insights, an overall picture emerges but interpretation thereof should not be left to the decision-maker. How are these intermediate products translated into adequate support to the focal investment decision? How do banking opportunities follow from these intermediate products? This paragraph describes the synthesis steps summarized in figure 10.

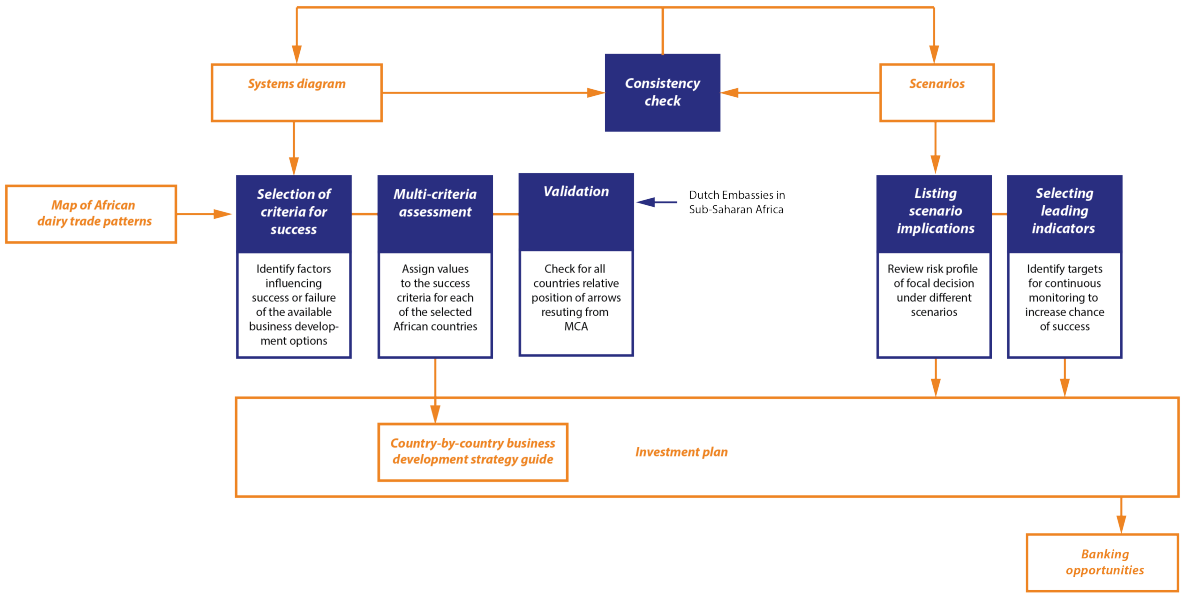


Figure 10 - Synthesis steps

2.4.1.1 Consistency check

Intermediate products should be consistent with each other to prevent the decision support from suffering from internal contradiction. Of crucial importance is reviewing the boundaries of the systems diagram. Points of attention are twofold. First, driving forces selected during the scenario process should be found on top of the systems diagram bearing in mind its actor-specificity. For instance, public policy is considered an external driving force if one looks at business development from the corporate decision-maker's perspective, whereas it would be located on the left side (i.e. considered a mean) if the system diagram were drawn up from the point of view of an African government. Insofar inconsistent, intermediate products – particular system boundaries – are revisited during this step. Provided that some ambiguity in a conceptual model will always remain, this step is intended to reflect on assumptions made, thereby increasing understanding, and to eliminate any striking inconsistency.

2.4.1.2 Country-by-country strategy guide: construction and validation

Trade patterns are the starting point for an investigation of which underlying country-specific characteristics can explain differences in import and export behaviour. Reviewing patterns against the structure of complex dynamics in the 'black box' of African dairy allows for pinpointing factors that may induce inference and ultimately influence success. In essence, comparing the two is some form of reverse engineering. In consultation with fellow FAR analyst Sierk Plaat, a selection of criteria is made that are at the root of the differences between the selected countries in Sub-Saharan Africa.

To prevent from the unreliability of African data (see paragraph 2.1.3.2 en 2.3.2) being reflected in the outcomes of the multi-criteria assessment, several safeguards are put in place. One the one hand, measures have been taken to circumvent data quality problems. For instance, data collected directly by independent research institutions (e.g. Wageningen University) – rather than data constructed on the basis of estimates provided by African authorities – are at the basis for assignment of values to criteria. Bearing in mind that investors are predominantly interested in the attractiveness of one country relative to another, values assigned are *judgments* rather than accurate representations of conditions. After all, that would be spurious accuracy. Appendix G lists the data sources and elaborates on the values assigned during this simple multi-criteria assessment.

On the other hand, outcomes have been subject to review by a number of Dutch embassies in Sub-Saharan Africa. They are assumed to be well aware of the position of their host country relative to its neighbours. The guide (see figure 16) has been sent out to the contact person at the embassy prior to the call to prevent sharing the underlying line of thought from feeding the temptation to believe the outcome. After all, individual interpretation and objective evaluation are the precursor of triangulation.

2.4.1.3 From scenarios to plan for investment under uncertainty

At this point, the scenario planner returns to the focal decision. How does each strategic option for investment look in each scenario? As stressed by Schwartz (1991), if a decision looks good in only one of several scenarios, then it qualifies as a high-risk gamble, especially if investor has little control over the likelihood of the required future coming to pass. Systematic review allows for better understanding of the risk profile of various options along the spectrum of dairy business development.

Subsequently, in line with Schwartz' approach, intuitive logics allow for identification of a few leading indicators to monitor in an on-going way. As markedly different paths of the future are presented, the ability of the corporate decision-maker to understand as soon as possible which of these scenarios is closest to the course of history as it unfolds is at the root of his flexibility to adapt.

2.4.1.4 Identification of banking opportunities

From the investment plans of external clients follow banking business opportunities. Prior to client interviews, relevant departments of Rabobank International such as Export Finance (EF), Trade & Commodity Finance (TCF), and Rabobank Foundation have been reached out to in order to better understand the type of transactions that they can financially support. Furthermore, the accompaniment of Sierk Plaat to important corporate clients helped to pinpoint banking opportunities linked to their revealed intentions. Thus, scenario interviews set the scene for bringing future plans, regardless of their concretion, to light.

3. DAIRY TRADE WITH AND ACROSS THE AFRICAN CONTINENT

This chapter presents key insights gathered through trade flow mapping. The aggregate patterns and dairy products trade maps can be found in appendix A and B, respectively. All findings are based on official trade statistics of 2013 (see also paragraph 2.1).

3.1 DEMAND PUT IN PERSPECTIVE: AFRICA'S ROLE IN GLOBAL DAIRY TRADE

With a total of 10.5 million tonnes MEQ, the African continent accounts for approximately 17% of world dairy trade volumes. Why made Africa nevertheless up such a strikingly blank part of the World Dairy map as published earlier (2012) by Rabobank International? The answer lies with fragmentation of the African economy and very low levels of intra-African trade, a phenomenon also stressed by the WTO (2012).

Of the 10.5 million tonnes MEQ imported into Africa, more than half flows into the North-African region. Algeria is clearly in the lead regarding dairy imports, but apart from Tunisia, all countries in North Africa make it to the top-10 destinations. Formally, only 5.2 million tonnes MEQ is imported into the Sub-Saharan region. Looking at the 2013 picture, differences of East versus West matter. This division deserves a word of caution. Officially, by UN definition, Mozambique belongs to the geographical area called Southern Africa. However, given the selection of countries made in response to clients' information needs (see paragraph 1.2), Mozambique has been included in the group of countries that constitutes East Africa throughout this report. As trade flows go across the borders of the ten selected countries, insights gathered through mapping these flows also stretch beyond the selection. Adhering to the formal geographical definitions, the dairy import volume into West-African countries (2661 MT MEQ) is almost five times the volume flowing into the severely protected East-African region (599 MT MEQ) – despite the fact that both regions hold an equal share of the Sub-Saharan African population. Figure 11 is intended to illustrate the difference. Bigger size trade maps are found in Appendix A and B.

Zooming in to country level allows for concluding that six countries in Sub-Saharan Africa made it to the top-10 destinations by 2013, half of which belong to the selected countries for this case study: Nigeria, Ghana and Mozambique. The latter is surprising, because fellow FAR analyst Sierk Plaat as well as interviewees located in Mozambique (*external client*, personal communication, 26 March 2015; *external client*, personal communication, 27 March 2015) confirmed that Mozambicans are no dairy consumers by tradition. There are two possible explanations. First, the demand for dairy is driven by expats, which appears likely given the sharp fall in dairy imports during 2014, a year marked by repatriation. Second, the so-called 'Mozambique channel' is known to be a strategic trade route for the Southern Africa Development Community, containing South Africa as dairy export hub. It should be noted, though, that formal imports into Mozambique might end up in neighbouring countries through informal channels.

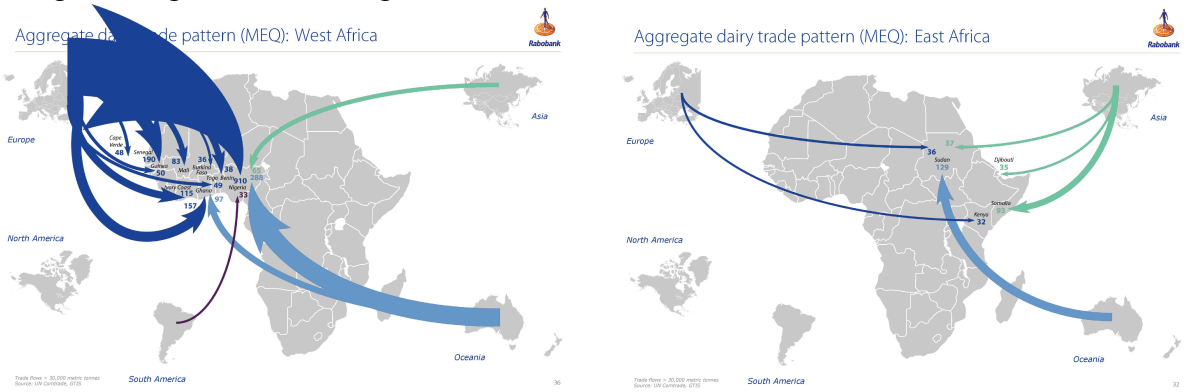


Figure 11 - Dairy imports into West and East Africa

3.2 PRINCIPAL TRADING PARTNERS: ORIGIN OF DAIRY IMPORTS INTO AFRICA

The influence of Europe is particularly large in the West African region, where 66% of dairy imports (MEQ) originate from the EU. Notwithstanding the two months shipping lead times to West Africa (*external clients*, personal communication, 28 April 2015), Oceania – with New Zealand the low-cost WMP producer – holds a 16% dairy import share in West Africa, rendering it the runner up in the region. For the African continent as a whole, EU accounts for 48% of all dairy imports into African countries, implying that EU involvement in other subregions of Sub-Saharan Africa must be substantially lower. When clustering imports into East Africa by origin, Asia suddenly enters the picture with a 35% share.

3.3 DAIRY TRADE ROUTES AND TRADE HUBS

Given that the majority of the flows putting Asia as a dairy supplying continent of East Africa on the map pass through the Middle East, a region that does not lend itself to local milk production, this pattern is more likely to indicate a transactional route along the EMEA offices of major dairy companies located on the Arabian peninsula.

The main intercontinental dairy trade hubs on the West Coast appear to be located in the four countries that have been selected because of interest among Rabobank external clients (see figure 12). Of all dairy imports (MEQ) into the region, 50% flows through the port of Lagos in Nigeria and another 25% flows through the ports of Dakar (Senegal), Accra (Ghana) and Abidjan (Ivory Coast). The remaining roughly 660 MT MEQ of the flow into West Africa appears to be highly fragmented, i.e. split over many smaller ports.

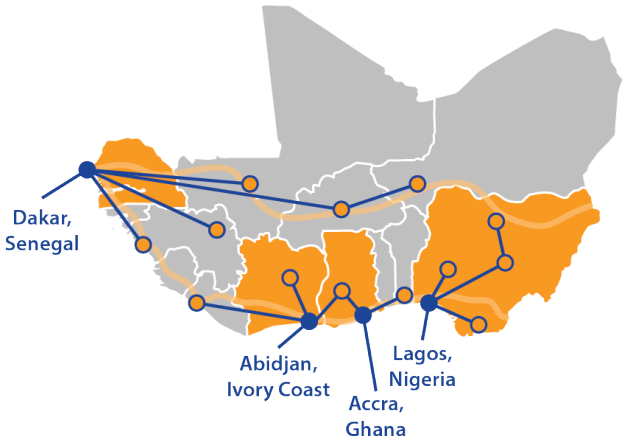


Figure 12 - Dairy trade hubs on the West African coast

3.4 INTRA-AFRICAN TRADE: EMERGING PRODUCTION AND TRADE HUBS

Who are the biggest exporters within Africa? The dairy trade performance of South Africa is outstanding (see appendix A.7). It takes up the role of production and logistics hub with substantial trade flows to neighbouring countries. The runner up countries, i.e. exporter number two and three, are found in the northern region: Egypt and Morocco. Their cheese industries are the dominant driver of outgoing dairy flows. Two of the selected countries make it to the top 5 of African dairy exporters: Kenya and Uganda. Considering the low import volumes, these two East African countries appear to production hubs. The bidirectional dairy commodity trade flows, in the interpretation of *an external client* (personal communication, 27 March 2015), indicate synergy rather than competition. Kenyan farmers are better able to cope with seasonality, thereby able to supply Uganda during the dry season. Good rainfall in Uganda, on the other hand, generates a flow of cheap milk to processing facilities in Kenya during the wet season. Thus, the actual direction of trade flows varies across the year in line with seasonality.

3.5 DAIRY COMMODITY PATTERNS AND CONSUMER PREFERENCES

Appendix B presents dairy commodity trade maps. Whole milk powder (WMP) is the most-important commodity for entire Africa. By 2013, an absolute quantity of 453 618 tonnes WMP has been imported, thereby accounting for more than a third of all dairy imports (MEQ) into the continent. Skimmed milk powder (SMP) and fat-filled milk powders (FFMP), the cheap replacement of WMP for exporters whose butterfat value is high, are the commodities that together constitute another third of all dairy imports (MEQ) into the continent. Whereas SMP flows have destinations all over Africa, trade in FFMP is clearly a West African story. These insights in powder volumes deserve a word of caution. Given that powdered milk may be input to milk reconstitution as well, it should be born in mind that these commodity imports are not necessarily consumed in powdered form.

Trade in other commodities is at a very low level in Sub-Saharan African. Roughly 75% of cheese and butter exports are going to North-African countries. Trade in infant foods is yet insignificant compared to total dairy trade.

How do these commodity trade patterns compare to consumer preferences as described by fellow FAR analyst Sierk Plaat, *external clients interviewed* (personal communication, 28 April 2015; Louis Dreyfus, personal communication, 6 May 2015) and reports of Wageningen University (van der Lee et al., 2013; Makoni et al., 2014)?

The West African consumer is said to have clear taste preference for powdered dairy products. They are affordable and associated with convenience, particularly if repackaged into small sachets. WMP easily finds its way to the market, while consumption of liquid milk remains at a low level. Also cheese is traditionally no part of the West African diet.

Dietary patterns in East Africa are extensively described by Makoni et al. (2014). Consumer demand is skewed towards raw milk that is generally boiled before consumption. This preference is not merely driven by its low price, as the taste of raw milk is perceived to be better than powdered milk and processed liquid milk (UHT). An exception to traditional East African consumption trends is Ethiopia, where the boiling practice is uncommon. The surplus of raw milk is mostly process into butter and typical cottage cheese (Ayib). These products are an effective way to deal with the religious fasting practices. Fasting for 180 days per year implies a notably lower average dairy intake of the Ethiopian population.

The comparison feeds into the conclusion that although both regions import primarily dry bulk commodities, West Africa is more likely to consume dairy in powdered forms. In other words, while opportunities for reconstitution of powder into value-added products may be expected on both sides of the Sub-Saharan African regions, opportunities for repackaging are likely to be limited to West Africa.

3.6 THE ROLE OF BARRIERS TO TRADE

In general, natural barriers to trade are distinguished from imposed barriers to trade. The former category includes aspects such as distance, non-adjacency and language difference, which are all well known to correspond to smaller trade flows (Hummels, 2001). The latter category may be subdivided into tariffs and non-tariff barriers, which may be either intended or unintended.

Trade patterns, if translated to per capita dairy import volume, may be compared to patterns in barriers to trade. Investigation has been limited to aspects of which underlying data may be assumed incontestable. Appendix C provides an overview. Although the data sample is too small to feed into statistical relationships, a couple of general insights may be derived. First, except from Ethiopia, all countries under consideration follow the general rule stating that the higher the level of imports tariffs, the lower is the per capita dairy import volume. Second, dairy trade levels are clearly lowest in landlocked countries. Per capita dairy imports are as low as 0,20-0,27 for the landlocked countries under consideration as opposed to 0,85-17,18 for their coastal neighbours.

4. COMPLEX DYNAMICS OF DAIRY BUSINESS DEVELOPMENT IN MULTI-ACTOR SETTING

Those aiming to enter or expand in the Sub-Saharan Africa dairy market are facing severe complexity rather than a well-structured problem. Some characteristic features of ill-structured problems (Enserink et al. 2010) appearing in this case study of African dairy are the large number of (potential) players involved, the conflicts of interests and – despite the exhaustive underlying spectrum of business development options ranging from trade to setting up local production – a unlimited number of investment opportunities. As stressed by Dunn (1981) ill-structured problems demand that the analyst first takes an active part in defining the nature of the problem itself.

The three types of uncertainties that contribute to wickedness of the business development challenge, as distinguished by van Bueren et al. (2003), have been used for structuring the complexity inherent to African dairy. The system model and actor analysis that fed into the framing of the challenge can be found in appendices D and E.

4.1 COGNITIVE UNCERTAINTY: IRREGULAR FLOW OF MILK AND MONEY

Cognitive uncertainty (van Beuren et al. 2003) results from a lack of knowledge about the causes and effects of problems. Causal relations are numerous, interrelated, and difficult to identify.
Supply meeting demand implies milk flowing from producer to consumer and money flowing in the opposite direction. For making a commitment to dairy sector development, it is of crucial importance to have insight in and control over these flows in order to be able to strategically invest – maximize profit while minimizing risk. The reality of African dairy is, however, in sharp contrast with the desired situation. Irregularity of flows – in combination with the inability of the sector as a whole to overcome it – manifests the most evident symptom of a wider array of underlying problems. Where does the irregularity take root?

With regards to milk flowing from cow to consumer, the very first cause can be found at farm level. The local climate results in extreme seasonality of raw milk production. During the wet season there is a lot of milk, while in the dry season there is no milk at all. Feed is crucial to cancelling out the distorting effect of droughts, but not available at an affordable price. The responsibility for building feedstock to get through the dry seasons is commonly ascribed to farmer cooperatives, but they lack both access to finance and warehousing facilities.
At the same time, dairy consumption is in general – with 180 days of fasting practices in Ethiopia as exception to the rule – rather stable. The lack of resemblance in dynamics of supply and demand underlines the need for installing processing capacity. After all, processing would allow for meeting demand during the dry season and for preventing the surplus of milk during the wet seasons from spoilage.

Installed processing capacity has a very low utilization rate on average. Why? In the first place, because quality on transport infrastructure in rural areas is low, rendering cost and time associated with milk collection too high. Furthermore, the amount of milk that can be sourced locally declines to a bare minimum during the dry season. Add to that the opportunism among subsistence dairy farmers – who tend to sell their milk to whoever pays the highest price regardless of supply contract in place – and processing facilities are being by-passed by Indian traders on bicycles. While the vast majority of raw milk produced locally continues to flow to the informal markets, processors are hardly making return of investment in their facilities.

With regards to money flowing from consumer to farmer, many of those involved in the formal value chain experience a similar problem. They receive only part of the money and/or payments often reach their pockets at other moments than agreed upon beforehand. This liquidity problem trickles down the chain. For the actual cause of these payment problems, one should look higher up in the chain. Retailers, providing the main outlet for processed milk, have gradually increased their payments periods. For small-scale African processors and farmer cooperatives – not rarely integrated into organizational structures with cooperatives owning small processing facilities – down in the chain, these long payment intervals interfere with their access to financial services. Although Rabo Development (personal communication, 10 March 2015) argued that the length of payment intervals would no longer be a pressing problem if local banks started to adopt cash flow rather than collateral principle for F&A finance, the irregularity of payments remains a problematic phenomenon in the African dairy value chain. The unpredictability of income intensifies opportunism among subsistence farmers, thereby hampering progress towards formalization of the value chain.

4.2 STRATEGIC UNCERTAINTY: LENGTHY CHAINS AND THE COMPETITIVENESS CHALLENGE

Strategic uncertainty (van Beuren et al. 2003) exists because many actors are involved. Their strategies to address the problem are based on their perceptions of the problem and its solutions, which may differ from the views of others.
No single actor can reinvent the African dairy supply chain on its own. They all appear to struggle with the lack of control, but for different reasons. For African authorities, three underlying public interests shed light on the desire for better insight and greater control on the flow of milk and money. First is food security, which translates into the objective of tackling the high and rising imports bills either through following the pathway of raising self-sufficiency insofar possible or by focusing on increase of exports in non-food or non-agriculture sector (Rakotoarisoa, Iafrate and Paschali, 2011). Second is food safety and quality, which translates into the objective of ensuring compliance with enforced dairy standards (Jensen and Keyser, 2012). Third is economic development, which translates into the objective of preventing loss of government revenue (OECD, 2005) linked to commercial dairy undertakings. For businesses, on the other hand, the virtual lack of control hampers their ability to minimize financial and reputational risks so crucial to the overriding interests of economic profit and continuity. What matters most to those Africans active in the vibrant small-scale dairy farming and trading sector is actually survival, which translates into the sometimes conflicting objectives of ensuring both stability and sufficient level of income. A more extensive and systematic comparison of actors can be found in appendix E, but the key message is clear. Problem perceptions differ significantly.

Problem perceptions, in turn, influence the behaviour of actors who hold them (Enserink et al. 2010). With, according to the World Bank, 70% of the Sub-Saharan African population (developing countries only) still living on less than 2 USD per day, the quest for affordability is clearly reflected in dairy consumption. In East Africa, 80% to 97% of milk is still marketed through the informal marketing, which is rendered most attractive to both farmer and (rural) consumer. In many situations the informal sector is very efficient for consumers to buy milk at a reasonable price and for producers to sell milk and receive a fair price (Makoni et al. 2014). However, more often than not, milk – if not consumed on farm – passes through the hands of loose/raw milk traders. Many of them only enter the scene during the low season. As soon as prices are driven up and the margin become reasonable, those who originally traded in other products suddenly switch to milk trade. On the other side of the continent, the low level of raw milk produced locally does not imply the absence of petty traders. Many individuals are able to glean some income by repacking powdered milk into smaller sachets and by smuggling small quantities of dairy across borders (see box 2).

Implications of this behaviour are twofold. In the first place, the dairy value chain becomes ever more lengthy. Lengthiness goes hand in hand with a decrease in transparency. Second, players operating in the formal market segment are struggling to compete with the coexisting informal market. They bear the imposed cost of compliance with regulations that the small-scale market operators manage to evade. Moreover, several value-adding steps add to their costs. Collection, cold storage, processing and distribution add to the price of processed milk compared to raw milk. While making the cost structuring more complex, the time required for these steps could mean that the dairy product has turned sour once reaching the supermarket shelves.

Box 2. Formal trade requirements as a competitiveness risk

A good example of how quality standards and laboratory testing requirements can militate against formal sector trade is the story of Uganda's exports of butter to Rwanda. In this case, Rwanda's only licensed trader bringing butter into the country decided to stop imports because of difficulties with recognition of Ugandan quality certificates and demands for additional laboratory tests by the Rwanda Bureau of Standards (RBS). According to the importer, this was because the batch numbers were not identical throughout each consignment since the butter was manufactured on different days. This problem also meant the trader could not obtain pre-clearance for the goods. As a result, the importer decided it would be easier to stop trading in butter and cancelled all orders with the Ugandan supplier.

Despite this move, Ugandan butter remained on store shelves in Kigali. As explained by border officials, it is impractical to stop small consignments from crossing and many dairy products are brought into Rwanda in small quantities, sometimes in cool boxes but otherwise with no refrigeration or other kinds of quality control. Similar to how formal sector dairy chains have a difficult time competing with informal milk vendors in domestic markets this story shows that formal traders also have a difficult time competing with informal traders in the regional market.

Although the efforts to regulate dairy trade and harmonize regional standards may seem like an obvious step towards an improved trade regime, such moves can actually have negative consequences for formal sector operators. While it is important to have a well- regulated trade system, the system must be cost competitive and simple to use in order to avoid creating further competitiveness constraints for formal dairy operators.

Source: Jensen and Keyser (2012)

Lastly, the threat of substitutes should not go unnoticed. Substitution does not occur merely between dairy products, between dairy and other protein-rich products or between dairy and other drinks. As stressed by *an external client*, for those African consumers living on 2 USD per day, the choice could be between Internet access and dairy (personal communication, 12 May 2015). All in all, competing in the African dairy market constitutes a severe challenge.

4.3 Institutional uncertainty: Unpredictability of business-to-government interaction

Institutional uncertainty (van Beuren et al. 2003) results from the fact that decisions are made in different places, in different policy arenas in which actors from various policy networks participate. The complexity, therewith unpredictability, and resource-demanding, therefore excessive costs, of dairy trade with Africa is rooted in both destination and product characteristics.

When thinking through the African dairy future, one easily comes up with statements about what should or could happen to sector development. But who is actually able to move the dial? The power of African governments – not to be viewed as a single, monolithic entity, but as a number of different authorities with their own constituencies and regulatory tools (Estache and Martimort, 1998) – should not be underestimated.

Why are the costs of moving goods across African borders so high? For local governments, income from customs duties is comparatively easy to collect. Moreover, the dependency thereon to finance their public administration is very large (Kommerskollegium, 2010). Ivory Coast, for example, relies on trade taxes for more than third of government revenue (OECD, 2005). As a result,

the interests at stake at the border are large. Whereas costs and lead times of inland transportation gradually decline with the expansion of the trans-African highway network (*external client*, personal communication, 28 April 2015), overall costs of trade remain high. The dairy market of East Africa has been protected through 60% import tariffs (WTO, 2014) and very limited leeway for tariff exemptions (Multilateral Development Banking, personal communication, 18 March 2015).

On top of these anticipated trade costs comes the financial burden of unpredictability and delays at the border. Sub-Saharan African countries generally remain bottom ranked if it comes to the efficiency of customs and border clearance (Arvis et al. 2014). Notwithstanding the policy efforts towards harmonization of food safety standards, even within customs unions such as the EAC, the lack of trust could manifest itself in the impossibility of obtaining pre-clearance (see box 2). There are a large number of border authorities and a lack of well-established routines for consultation between operators and authorities (Kommerskollegium, 2010). Red tape is omnipresent. Furthermore, as confirmed by *an external client* (personal communication, 28 April 2015), corruption is deeply rooted in the African business culture. What a dairy trader faces on the ground is rather paradoxical. Porous borders – in particular between Algeria to Sahel region, Cameroon to Congo – coexist with border authorities requiring opaque licence fees, countless roadblocks and illegal taxes. Underinvoicing is rather common if it comes to clearance of goods, which poses a serious threat to international players aiming to obey the law and disassociate from corruptive practices.

Also intra-firm trade is hampered by high costs and severe unpredictability. As explained by an *external client* (personal communication, 10 April 2015) managing the export of a container of dairy products to its subsidiary in Nigeria is a fulltime job. The federal government makes no exception for internal transactions as to requirement of a letter of credit, the document guaranteeing that the seller will receive payment in full as long as certain delivery conditions have been met. Also on the export side, costs of business-to-government interaction appeared to be on the rise. *An external client* confirmed that growing dairy exports have been in spite of and not due to trade facilitation programs (personal communication, 10 April 2015). With food scandals becoming far more than mere setbacks, the tendency towards stricter control to ensure safety and security has suppressed the success of trade facilitation programmes aiming at simplification of procedures at the European border (Dutch Tax Authority, personal communication, 8 April 2015). Bearing in mind that Europe currently accounts for roughly two thirds of imports into Sub-Saharan Africa, this procedural complexity adds to the institutional uncertainty.

The story of a Nigerian dairy company in the Economist (2015) illustrates that difficulties are not limited to foreign parties and international borders. Flying down from Kano to Lagos costs a fortune while running the risk of spoilage during waiting time. Refrigerated trucks – associated with opaque license fees, formal taxes and nightmare of paperwork – provide no better alternative route to the urban markets of Nigeria.

From a product perspective, the cost and unpredictability become apparent form the export of dairy products from Denmark as described in the Food Living Lab carried out through the ITAIDE project (Henningsson et al., 2011). Goods could get stuck at the border because of an error in or refusal to recognize one of dozens of required paper documents. The container's content will soon be spoiled while waiting for the corrected certificate to arrive. As dairy products consist of organic material that may be carriers of contagious diseases or chemical substrates that are unhealthy to consume, the export and import of food products are the concern of several different governmental agencies. Agencies for agriculture, health, veterinary, customs, statistics, and value added tax (VAT) each put their information requirement on the traders to grant export or import rights. What further complicates matters is that food products are also perishable and are dependent on fast transportation from producer to end consumer. In combination, these two characteristics reveal why international dairy trade is a particularly complex and resource demanding type of trade.

4.4 CONCLUSION

Why have many potential market entrants have continued to circle around the African continent? Uncertainty is at the core of the answer. However, uncertainty is not simply the absence of knowledge (Walker et al. 2003). The knowledge gap filled through trade mapping (see chapter 3) is not enough to unlock this paralysis. Partial analyses have shed light on the initially 'black box' of African dairy sector dynamics. It has become clear that the corporate decision maker is dependent on other actors for making strategies work for success. Aligning interests and leveraging shared resources are quintessential steps towards reduction of the three types of uncertainties that contribute to wickedness. Coalitions and contracts are needed to be developed to (1) ensure more regular flows of milk and money throughout the chain, to (2) cope with the tendency towards too lengthy chains to be competitive against informal market, and to (3) increase the manageability of institutional uncertainty.

All in all, understanding system dynamics and forming coalitions will strengthen the position of business developers. Nevertheless, fundamental uncertainty remains, particularly about the external driving forces and how they change over time. The next chapter addresses the uncertainty about which changes in political, economic, social, technical and ecological context are relevant for successful investment in African dairy business.

5. EXPLORATION OF THE FUTURE: SCENARIOS

When developing scenarios, Schwartz (1991) recommends starting "from the inside out". The focal decision is: *"Whether or not to invest in dairy business development in Sub-Saharan Africa - and if so, where and how?"*. Chapter 4 revealed the complex dynamics that ultimately determine success or failure of business development. In paragraph 5.1, macro-environmental driving forces that influence these key factors are listed and described. Ranking driving forces by impact and uncertainty resulted in scenario axes (paragraph 5.2) and ultimately a range of African dairy scenarios (paragraph 5.3).

5.1 DRIVING FORCES

In order to allow for ranking, the macro-environmental aspects mentioned during interviews and in the literature have been grouped together into eight driving forces (see appendix G.1). Some other driving forces cannot be taken for granted, but the direction in which they will move has been assumed to be rather predictable. In other words, making them subject to review by expert would render the ranking procedure unnecessary complex without altering the outcome. Demographic forces are often considered to be predetermined (Schwartz, 1991) and so will be population growth and urbanization for this African dairy case. Indeed, these two driving forces directly feed into the starting assumption, which is that the growth rate for dairy demand will outpace local production growth.

Similarly, unimportant driving forces have been left aside for the purpose of ranking. The eight forces that have been selected for presentation to a number of experts (see appendix G.2) are further clarified in the paragraphs hereafter.

With regards to the values at the end of the arrows – indicating extremes of the range of influences the driving forces might have – the rationale has been based on the degree of consensus among people interviewed (see appendix H). If there was consensus as to the direction of change but uncertainty with respect to the pace thereof, values are defined relative to the status quo. In case of lack of consensus regarding direction of change in the very first place, extreme values are defined in absolute terms.

5.1.1 Government policy towards foreign goods/investors

African governments may – actively or passively – support or restrict the flow of goods and capital into their country for a variety or reasons such as improving food security, boosting the flow of money into their coffers, ensuring infrastructural development or protecting local producers against the threat of foreign market entrants. This driving force entails the aggregate effect of both policy measures and the enforcement thereof. Measures interfering with trade flows include those in the field of trade facilitation, tariffs and non-tariff barriers (NTBs) to trade. Particularly for NTBs, it is important to consider the potential or actual *impact* rather than the *intention* to have a discriminatory effect on foreign suppliers of goods (Cadot and Malouche, 2012).

This political driving force may affect both the "where" and "how" component of the focal decision. The systems diagram (see appendix D.3) helps for understanding how government policy might change the prospect of success or failure drastically. It influences the following key factors: tariffs, taxes and red tape at the border.

5.1.2 Political stability

The political landscape of post-independent Sub-Saharan Africa has been one of rampant coups d'etat (Fosu, 2003). Experts are, however, divided on the influence of political stability on bilateral trade flows. Srivastava and Green (1986) conclude that political instability is found to have a significant influence on exports but little direct effect on imports. Results of Fosu (2003) support the hypothesis of a serious adverse impact of political instability on export growth. At the same time, the distortion of exports might have profound implications on the ability to import of poor countries that are already net importers of food. Precisely that category is overrepresented in Sub-Saharan Africa, as illustrated by the list of countries presented by *(Rakotoarisoa, Iafrate and Paschali, 2011)* whose total export revenues of total merchandise were far short of agricultural import bills.
With regards to FDI, in case of predominantly aiming for setting up local dairy production, evidence is more straightforward. From the often-quoted work of Root and Ahmed (1979), the only political factor emerging as a discriminator for the FDI flows into developing countries appears to be the number of regular (constitutional) changes in government leadership over a decennium. It is suggested that foreign investors may view political stability from a long-term perspective and may not be easily impressed by recently established stability (Root and Ahmed, 1979).
To prevent from including heavily interrelated driving forces, corruption has been tied to the concept of political stability. Although this pragmatism may render the scope of this driving force opaque, it is the weaving together of conceptual building blocks that allows for deepening the understanding. As stressed by Schwartz (1991) scenario creation is not a reductionist process, it is an art, story telling.
Hence, the U-shaped relationship between political stability and corruption (Campante, Chor and Do, 2008) has been retained. In that light, the benchmark specification by Asiedu (2006) – showing that a decline in the corruption from the level of Nigeria to that of South Africa has the same positive effect on FDI as increasing the share of fuels and minerals in total exports by about 35 per cent – further underlines the distorting effect of this driving force on business development.
All in all, this driving force is most likely to affect the "where" component of the focal decision. From the systems diagram (see appendix D.3) if follows that political stability starts to interfere with dairy business development through the following key factors: fragmentation of the public authority, illegal taxes and opaque fees, civil unrest and income inequality.

5.1.3 Formalization of retail

This economic driving force is most likely to affect the "where" component of the focal decision. After all, it indicates the size of the formal market, which may be seen as the only segment foreign players can operate in. If there are no formal retail channels to market, it becomes difficult if not impossible to get your dairy product to the consumer. From the systems diagram (see appendix D.3) it follows that formalization of retail might influence successful business development through the number of supermarkets as points of sale for processed dairy.

5.1.4 Corporate social responsibility, globalization and trade liberalization

Opponents of globalization often point to its negative effects on local communities (Kanter, 2003). The vast majority of those interviewed, without being asked about it, showed some concern as to the public opinion surrounding investing in African dairy. Two examples (personal communication, April/May 2015):

- The negative perception of "dumping" additional dairy supply expected to follow from removal of EU milk quota on the African market
- The growing rank-and-file of the Sustainable Trade Initiative, a private sector instrument actively supported by the Dutch Ministry of Foreign Affairs

Given the sharp contrasts in the operating policies of global companies, there is no consensus as to whether the implications of globalization and trade liberalization on economic growth of developing economies will generate primarily support or opposition over the medium term. After all, with corporate behaviour varying from traders lobbying for tariff exemptions to for example WAMCO, a subsidiary of FrieslandCampina, investing millions in the Nigerian infrastructure (Bloomberg, 2015), the response may be equally mixed, but also polarized.

This socio-political driving force may be said to affect the very primary part of the focal decision, which is "whether or not" to invest in the dairy sector of Sub-Saharan Africa. As becomes clear from the systems diagram (see appendix D.3) the public opinion is assumed to affect the demand-side of dairy business.

5.1.5 Exchange rates and economic stability

From basic economics it follows that when a real exchange rates is high, the relative price of foreign goods becomes more attractive, which most likely causes exports to decrease while imports rise. Moreover, exchange rate volatility has a negative (even if not large) impact on trade flows (Auboin and Ruta, 2011).

To summarize, this economic driving force may be regarded a determinant of the attractiveness of trade relative to setting up local production, thereby influencing primarily the "how" component of the focal decision. The arrows in the systems diagram (see appendix D.3) indicate that exchange rates influence business through civil unrest but also because they add to unit cost of a dairy product.

5.1.6 GDP per capita

GDP per capita is an important driving force on the demand side because of the fact that dairy consumption increases with an increase of household purchasing power (Delgado et al. 2001; Regmi et al. 2001). While African countries have grown at a reasonable rate over the last decade, this growth has been driven by volatile commodity prices (UNCTAD 2013). Despite the recognition that diversification of exports is needed to sustain growth (UNCTAD 2013), international tariff escalation has reduced Africa's opportunity to actually diversify exports while making export

revenue vulnerable to raw commodity price shocks *(Rakotoarisoa, Iafrate and Paschali, 2011)*. Particularly these years, prices of a couple of Africa's main export commodities have been highly volatile and falling. According to the latest issue of Commodity Markets Outlook (World Bank 2015), particularly oil commodity prices are expected to remain weak for the remainder of 2014 and through much of 2015. Moreover, GDP contribution by revenues from traditional exports such as cocoa, coffee and spices are very uncertain and at the mercy of volatile international market prices. In other words, little export diversification is one of the main reasons why GDP growth is rather uncertain.

It should be noted that the interest is in GDP per capita based on purchasing power parity (PPP) rather than nominal GDP per capita. Purchasing power parity converts the number of units of a country's currency required to buy the same amounts of goods and services in the domestic markets as US dollar would buy in the United States.

This socio-economic driving force is relevant mainly for the "where" component of the focal decision. After all, GDP per capita serves as an indicator of the size of the consumer market. Appendix D.3 reveals that this driving force enters the systems diagram on both demand side and supply side.

5.1.7 Quality of logistics infrastructure

This technological driving force is of concern in particular for the "how" component of the focal decision. Given quality differences across the country, the infrastructure could support/hamper collection or distribution more severely. As such, the quality of logistics infrastructure interferes with the feasibility of one strategy relative to the other. It should be noted that the quality of inland infrastructure and African nodes in international transportation networks could be subject to improvement at a different pace. The systems diagram (see appendix D.3) helps for understanding how this driving force could change the prospect of success or failure drastically. It influences the transportation lead times, therewith indirectly contributing to product cost and spoilage.

5.1.8 Intra-African trade

Traditionally, the level of intra-African trade has been remarkably low. As becomes clear from the trade map in appendix A.7, by 2013 there has been only one aggregate dairy trade flow bigger than 30,000 tonnes MEQ crossing and intra-African regional border. In particular for bulk commodities such as dairy, the exceptionally high cost of transportation across Africa act as an inhibitor to trade between, for example, East and West. There are yet clear intentions to boost intra-African trade, of which the recent agribusiness trade partnership between Kenya and Nigeria serves as a vivid example. During the interviews (personal communication, April/May 2015) it became apparent that the vast majority regarded these rather as a form of gesture politics. Notwithstanding these doubts as to the actual impact, the United Nations ascribes Intra-African trade enormous potential to create employment, catalyse investment and foster growth (UNCTAD, 2013).

In conclusion, this economic driving could change the answer on both the "how" and "where" component of the focal decision. Given the consensus on the growing level of intra-African trade, the shift from fragmented to regional economy implies that the prospects for access to markets change fundamentally. It should be noted that the intra-African trade is absent in the systems diagram (see appendix D.3). After all, this diagram presents the simplified business dynamics of today, in which regional trade plays no significant role.

5.2 SCENARIO LOGICS

Ranking these eight driving forces by importance and uncertainty (see paragraph 2.3 and appendix F) resulted in the classification shown in figure 13. Issues ranked high impact – high uncertainty are called the critical uncertainties. These are the issues that have the potential to fundamentally shift the assumptions under the strategic agenda and whose outcomes are highly uncertain (Chermack 2011).

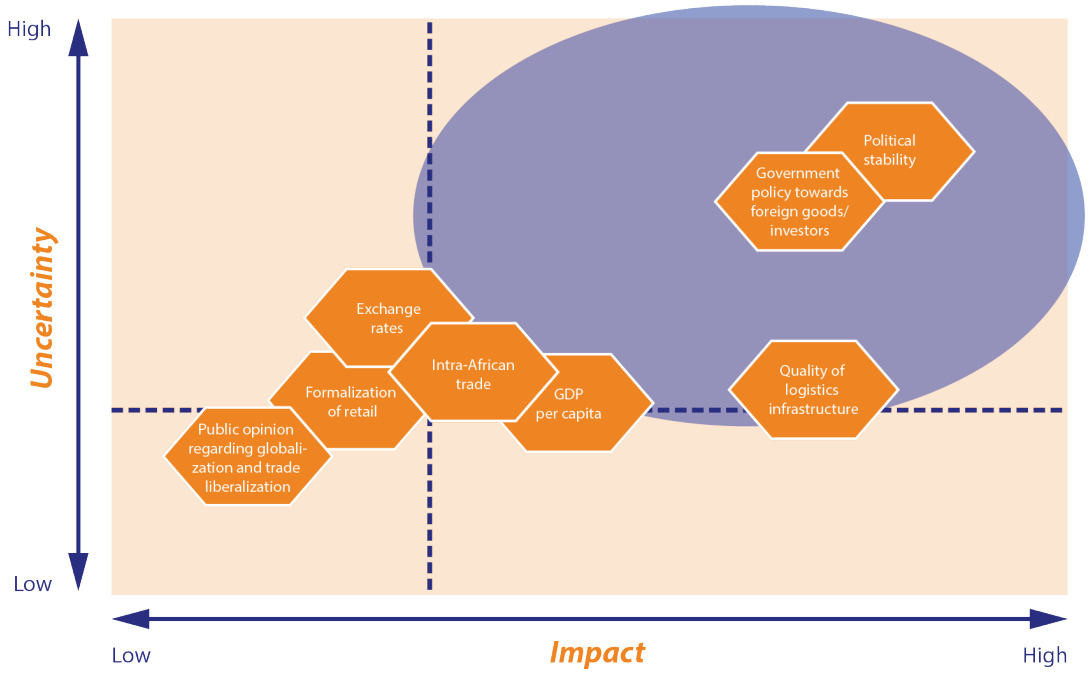


Figure 13 - Overview of critical uncertainties

Three critical uncertainties have been selected as the axes for possible future scenarios (see figure 14). These axes together making up the skeleton are called the scenario logics. Although for practical reasons such as clarity or intelligibility often only up to three axes are elaborated (Enserink et al. 2010), the potential lack of consistency in attitude towards trade and FDI reveals the need for doubling the axis and paying special attention as to the target of policy measures in the scenarios.

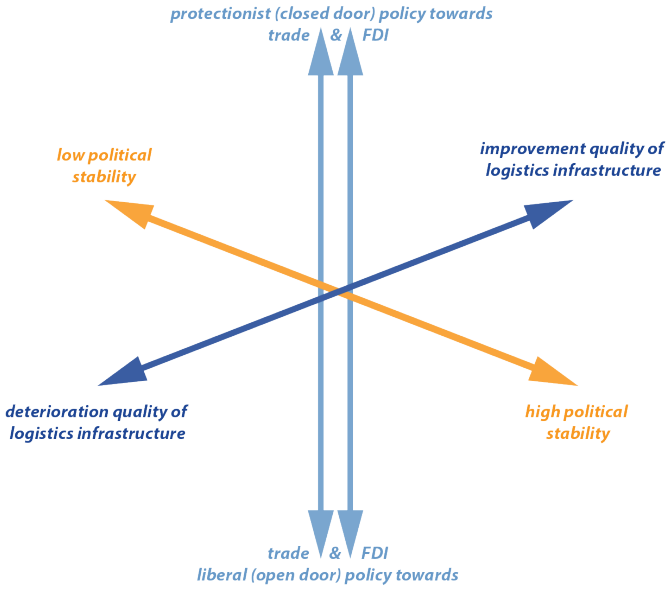


Figure 14 - Scenario drivers

5.3 POSSIBLE AFRICAN DAIRY SCENARIOS

The scenario logics framework allows for identifying some business-as-usual scenario. Theoretically, the dairy sector could become nested in a "Western" macro-environment characterized by liberalism, high degree of political stability and the infrastructure becoming prioritized and rapidly upgraded. Bearing in mind the ultimate aim of preparedness to operate in initially unanticipated African dairy futures, scenarios have instead been selected for their powerfulness as vehicles for challenging the decision-makers' mental models about the world. Three possible – not necessary most plausible – future scenarios have been constructed to this end. A disclaimer should be added, as scenarios come in lots of different types (Enserink et al., 2010). The extreme variability inherent to the African context renders the presentation of picture of a future situation, and particularly the attachment of a label (e.g. 2030 or 2050) to it, hardly sensible. Therefore, scenarios presented hereafter should be interpreted as a portrayal of possible *paths* that lead us out of today and into the future.

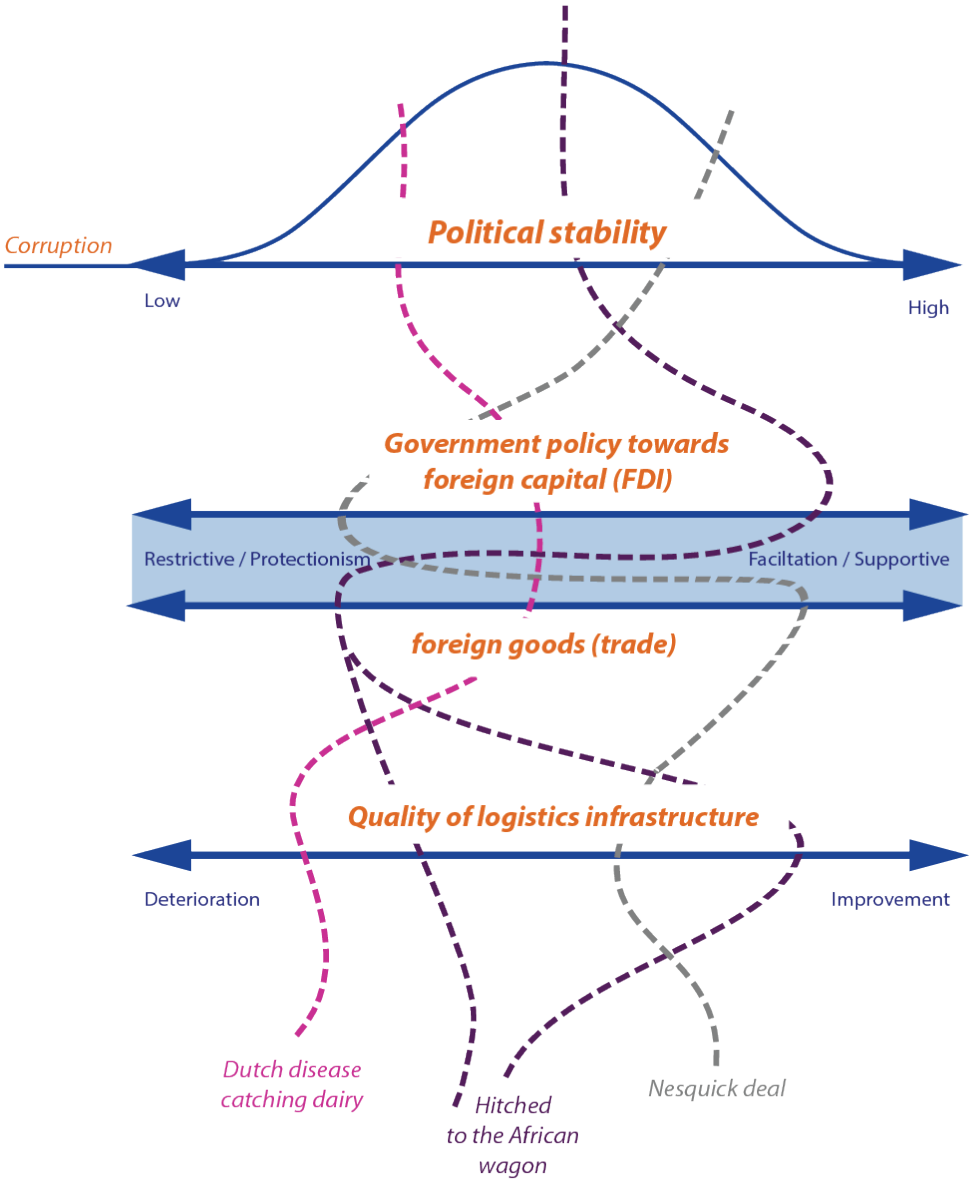


Figure 15 - Overview of African dairy scenario logics

6.3.1 Dutch disease catching dairy

The courses of post-independence politics in Africa have been erratic and marked by numerous internal and even regional conflicts, which often arise because of rivalries for the control of resources (Rakotoarisoa, Iafrate and Paschali, 2011). Nigeria provides the most powerful example (see box 3).

Box 3. Big fish (or shark) in a small pond – Nigeria's ills spill across its borders

[…] Every year, 2m or so barrels of oil are pumped out of wells in Nigeria, rendering it the biggest oil producer of the continent. However, Nigeria is not solely an exporter of oil, yet also an exporter of insecurity to neighbouring countries. As many as 1 in 5 barrels is reckoned to be stolen, often with the connivance of politicians. However, fuel smuggling is not the only problem. Ghana has been hurt by Nigeria consistently failing to fulfil a contract to supply its neighbour with 120m cubic feet a day. In fact, it has recently been providing as little as half that amount, causing Ghana to fall short by as much as a third of peak demand for electricity every day. […]

Piracy is another growing regional problem that can be blamed largely on Nigeria's inability to police its oily creeks in the Niger delta. Ships along the coast between Ivory Coast and Angola have been attacked. Ghana's offshore stretch is now particularly exposed. Piracy may cost the region as much as $2 billion a year. […]

Source: The Economist (2015), edited

Whilst negative spillover effects of the Nigerian oil and gas wealth have already received ample attention, the implications of the recent entrance of new African countries in the oil, gas and mining industries are largely overlooked. What will follow from the new rush to discover and exploit hydrocarbon resources in West Africa, and particularly in the Gulf of Guinea (Bazilian, 2013)? On the Eastern side of the continent, Mozambique has become an increasingly attractive mining destination (The Economist, 2012) and its coal and offshore gas reserves have recently lured pots of foreign investment (The Economist, 2013). Although the Tanzanian gas industry it still in its infancy – sizeable gas deposits discovered by 2010 are yet being explored – troubles over the sharing of gas revenues have already spilled over in the public debate (The Economist, 2015). What are exactly the consequences of these developments of the future that is about to arise? The concept of the 'resource curse' suggests that large, newfound resource endowments can both directly and indirectly result in poor forms of governance that in turn incite, prolong and intensify political instability, graft and violent conflict (Ross, 2012).

Insecurity and political instability are exactly the core problems that turn away both local and foreign investors (Rakotoarisoa, Iafrate and Paschali, 2011). Conflicts and wars also destroy the already degraded infrastructure, worsen food production and food distribution, and increase the dependency on food donations and imports (Rakotoarisoa, Iafrate and Paschali, 2011). The lack of political stability at the same time challenge the enforcement of public policy, regardless of their protectionist of liberalist nature. Furthermore, on the production side, a Dutch disease effect of natural resource abundance on agriculture, including the dairy sector, may be expected. This phenomenon describes the situation whereby the positive wealth shock from the natural resources put pressure on demand for domestic goods and services in a way that consequently raises the value of the local currency (real exchange rate appreciation). As a result, other parts of the economy – agriculture for example – become less competitive in international markets, thereby stifling development of those sectors (The Economist, 2014). Thus, the expansion of oil, gas and mining activities in Africa do matter for dairy sector development.

Institutional deficiencies, insecurity and conflicts in many African countries equally affect the consumption side as well (Rakotoarisoa, Iafrate and Paschali, 2011). The absence or weakness of structures that protect consumers' rights and control the safety and quality of food circulated in the African continent encourages the dumping cheap foreign products whose sanitary quality are sometimes suspect (Henson et al. 2000; Bagumire et al. 2009). At the same time, the political instability has the potential to expel the most loyal segment of dairy consumers, i.e. the expat population. In Mozambique, low global commodity prices are challenging local gas and mining

activities and the country is struggling to prevent a slide back to civil war (The Economist, 2013). The political tension between the Mozambican government and former guerrilla group Renamo is rising and associated with numerous roadblocks and violence in the northern region (*external client*, personal communication, 26 March 2015). Add to that the opposition over the proceeds of new gas reserves and the recent political murder in Maputo (The Economist, 2015) and it may have been a wise decision of foreign companies to already repatriate the vast majority of their employees (*external client*, personal communication, 26 March 2015). The dynamics of dairy imports into Mozambique more than tripling between 2009 and 2013, but collapsing by 2014 might well reflect the presence of expats. After all, Mozambicans are by tradition no dairy consumers, rendering high responsiveness of dairy consumption to national income unlikely employees (*external client*, personal communication, 26 March 2015).

All in all, the abundance of natural resources presents a plausible future that turns African dairy business into an uphill struggle. The resource curse brings about severe political instability, which turns away investors. In parallel, the Dutch disease effect further constrains dairy sector development. The prospects of trade, notwithstanding the increasing dependency on import volume and poor enforcement of protectionist policies, are not much brighter. Political conflicts are associated with roadblocks and in the longer term cause the transportation infrastructure to deteriorate, making it ever more difficult to distribute the imported dairy products to consumers.

6.3.2 Hitched to the African wagon

African countries aiming to tackle high and rising food import bills and to solve food insecurity generally face two different pathways (Rakotoarisoa, Iafrate and Paschali, 2011). One pathway is to reduce directly the dairy trade deficit by boosting domestic milk production. The other pathway is to temporarily ignore the agricultural trade imbalance and to find ways to increase exports in non-food or non-agriculture sectors (e.g. oil and mining) to finance food bills. However, the two are not mutually exclusive. In line with the parallel with South-East Asia, drawn numerous times, African governments could be expected to reinforce the pull to independence by carelessly embarking on both paths simultaneously. What would happen?

They adopt stricter protectionist policies targeting incoming trade flows – a method belonging to the first pathway – and pull out all the stops to raise the self-sufficiency in dairy. Western African countries follow the example of Nigeria. In an attempt to ameliorate their deficit, the Federal Government of Nigeria has set up a National Dairy Transformation Agenda (NDTA) with the main objective being to achieve an increase in dairy production from the current 469,000 MT to about 1.1 million MT over a period of 4 years (Ambali, n.d.). With the Nigerian self-sufficiency rate currently under 35% (van der Lee et al., 2013) while the climate in northern regions and the Jos plateau is perfectly suited for dairy farming (Sierk Plaat, personal communication, n.d.) the more than doubling of domestic milk production aimed is theoretically possible. Their success becomes a source of inspiration for neighbouring countries. The more one starts moving to the west, the more expensive and challenging local milk production becomes. Being confronted with the difficulties of raising production, a sense of urgency regarding protection against cheap imports starts to grow among ECOWAS member states. While the Nigerian NDTA incentivized international dairy players to expand to Ivory Coast (*external client*, personal communication, 30 April 2015), ECOWAS making up a real bloc through such a radical approach to reducing trade deficit implies that the easy way out is no longer available.

What if ECOWAS member states jointly raise their tariff profiles from the current 20% (WTO, 2014) to level close to the 60% (WTO, 2014) currently enforced by the East African community? One would expect this 40% increase in tariffs to result in a substantial reduction of the current 2.7 million tonnes (MEQ) of dairy currently flowing into the West African region (see paragraph 3.1). Moreover, high tariffs are associated with a higher level of corruption (Gatti, 2004). Those trading in dairy see the costs of unpredictability rising. Delays in the port become more frequent and lengthy, the competitive disadvantage due to selective underinvoicing practices increases and more money is spent on opaque fees. While corruption flourishes under medium political stability, margins become squeezed.

At the same time, African governments embark on the second path. Alongside the prevalence of protectionism against trade, African governments announce a radical revision – but supportive, not restrictive – of policy targeting in the inflow of FDI. Radicalization of pubic policy is not confined to an ever more liberalized regimes for inward foreign investment, which developing already have tended to put in place for a decade (Fontagné, 1999). Their proactiveness in attracting FDI is spearheading economic transformation and the crux to becoming independent of development aid. The Ethiopian investments landscape, for example, becomes entirely different. Following decades of heavy restrictions on capital flows and among the lowest inflows of FDI within Africa – notwithstanding the gradual improvement and the recent Growth and Transformation Plan already offering some room for manoeuvre (US Department of State, 2014) – the mirror image arises. Ethiopia's investment code no longer prohibits but supports foreign investment in banking, insurance, and financial services. Telecommunications, power transmission and distribution and postal services are no longer fully state-owned. Areas of investment that used to be reserved for Ethiopian nationals (such as transport, forwarding and shipping services) are not merely opening up to foreign private sector expertise, but also to foreign private capital investments. With the Ethiopian population to reach 280 million by 2050, rendering it the runner up of Nigeria, and severely protectionist trade policies, international companies increasingly switch to FDI to leverage the rise of the African consumer.
Either to reduce their own transportation costs or to be able to negotiate exemptions to the harsh tariff regime, foreign investors are pumping money into the transportation infrastructure. The major interest linked to this private capital inflow implies that infrastructural improvements in the one region cannot keep up with developments in the other. A substantive cut in transportation costs and lead times to oil and mining fields are fertile agricultural areas is realized, while infrastructure that should provide access to less attractive lands remain underdeveloped. Strategic pricing in the shipping industry adds to rapid development of only some international ports. As illustrated by Arvis et al. (2007), their tendency to set higher tariffs in smaller ports with less traffic, results in African exports getting processed in for example the Dakar port, in Senegal, rather than in Nouakchott, Mauritania, despite the border crossing costs and longer distance to market. Moreover, the shipping industry continues to leverage scale and their route networks become ever more linked to a limited number of ports of call that are able to process the biggest ships. Smaller ports are by-passed and geographical patterns of industrialization and migration of the African population shift.

All in all, doing dairy business is no longer a matter of putting a dairy container on the route to Africa. The future presents the hurtling African train of which the group of foreign investors becomes the locomotive. In other words, multinationals get hitched to the wagon heading for local dairy sector development.

6.3.3 The Nesquick deal

According to the (Rakotoarisoa, Iafrate and Paschali, 2011), only about one-third of African countries (19 out of 53 countries) had enough agricultural export revenues to pay for their food import bills in 2007. The picture is similar for the ten Sub-Saharan African countries under consideration. By 2007, four of them (Rwanda, Mozambique, Senegal and Nigeria) were unable to repay their food imports by exporting agricultural commodities. At the same time, none of them belongs to the group of African countries whose total exports revenues (both agricultural and non-agricultural) were far short of food import bills.
In other words, the selected Sub-Saharan African countries are able to finance part of their food imports bills with the revenue generated by exports in non-food or non-agriculture sectors (e.g. oil and mining). The Nigerian trade balance most vividly illustrates that this pathway can be successful, albeit its sustainability may be questioned in the longer term. By 2007, food imports into Nigeria summed up to 9.28 times the value of the total agricultural exports. In spite of this imbalance, Nigeria was well able to finance its food imports bills. The ratio of food import value relative to total export value was merely 0.08 (Rakotoarisoa, Iafrate and Paschali, 2011).

What if African governments make food security their uncontested number one priority and temporarily ignore the dairy trade imbalance? They would start to acknowledge that cheap dairy imports provide an easy way out relative to the lengthy, challenging path of setting up or scaling up local milk production. In response, they start to lower or even eliminate their import tariffs in order to increase affordability of dairy products in the local market. Bearing in mind that dairy intake tends to increase once purchasing power allows for it, dynamics reveal a positive feedback loop. Add to that the fact that African countries seeing their population double or even triple by 2050 (Planz, 2013) and the market pull becomes evident. The flow of affordably dairy imports into Sub-Saharan Africa multiplies.
Economic growth is a prerequisite for guaranteeing the ability to pay the associated ever-growing dairy import bill. Consequently, African governments further restrict inward FDI so as to protect domestic market operators and maintain control over those sectors critical to the flow of money into government coffers. As economic growth rises in parallel with the food import bills, public budgets remain tight. Combined with protectionist policies against FDI, availability of capital continues to constrain infrastructural development. Thus, this future features marginal rather than radical improvements of infrastructural quality.
Although oil and minerals wealth traditionally boosted national income of many African countries, governments acknowledge that having entered the era of highly volatile global commodity prices, export diversification has become the crux to reducing vulnerability. Whilst dairy trade recedes to the background, Africa is seeking alternatives to ameliorate overall agricultural trade imbalances. Governments pin their hopes on negotiating "Nesquick deals". In other words, they more frequently aim for setting up bilateral trade agreements that directly link powdered milk imports to exports of traditional agricultural commodities such as cocoa.

Altogether, this scenario reveals a desire for bigger trade flows coming in and going out of the continent. Governments move from words to deeds to tackle what matters most to Africa: cutting excessive trade costs (Portugal-Perez and Wilson, 2008). They leverage the possibility to skip several stage of information technology (Kommerskollegium, 2010) that facilitates the flow of goods across borders. The number of authorities at the borders is being reduced and procedural transparency increases. Whilst the incentives for corruption by border officials already decline with the reduction and/or elimination of dairy import tariffs (Gatti, 2004), the far-reaching reform of border procedures renders corruption less perseverative than ever before. Driven by the vested interest in full realization of gains from trade, a fast-track procedure towards mutual recognition, standardization and harmonization is being followed. Africa delivers the proof of their ability to reverse the situation. After three decades in which Africa's share of the world exports pie has dropped by nearly two-thirds (Portugal-Perez and Wilson, 2008), their share is being enlarged again.

6. PLAN FOR INVESTMENT AND BANKING OPPORTUNITIES

This chapter serves to synthesize analyses. Adequate decision support requires linking insights gathered through trade flow mapping (see chapter 3), insight into dynamics of the once 'black box' of African dairy business (see chapter 4) to the focal issue of planning for investment, as well as reviewing those investment plans for vulnerability in the light of possible courses of the future (see chapter 5).

Paragraph 6.1 centres on the answer to the first half of the focal decision, i.e. *"Whether or not to invest in dairy business development in Sub-Saharan Africa?"*. Paragraph 6.2 provides an answer to the second half, i.e. "*if [investing] so, where and how?"*. Since the tenability of decision support is limited in volatile macro-environments, paragraph 6.3 provides guidance for reviewing decisions made today on a regular basis by borrowing from the logics built into the possible courses of the future.

6.1 IMPLICATIONS OF SCENARIO PLANNING: RISK PROFILE

The three options for business development (see paragraph 1.4) may be thought of as a spectrum with trade in dairy products as the one extreme and setting up the entire value chain locally as the other. Milk reconstitution is placed in between because it involves both trade – of bulk commodities produced elsewhere – and local processing into value-added consumer products. Table 4 provides an overview of the risk profile of the available strategies in the each of the scenarios outlined in paragraph 5.3.

Table 4 - Risk profile of available strategies in each scenario

	STRATEGY		
	TRADE	MILK RECONSTITUTION	LOCAL PRODUCTION
Dutch disease catching dairy	Medium	Medium to bad	Bad
Vulnerabilities	Cost control (unpredictable B2G interaction, logistical challenge)	Capital investment risk (political conflicts, war) Value-added market collapse (repatriation expats)	Capital investment risk (political conflicts, war) Local products unaffordable (Dutch disease effect)
Hitched to the African wagon	Bad	Medium to good	Good
Vulnerabilities	Imported product unaffordable (high tariffs and NTBs)	Margins squeezed (cost of powder inputs initially high)	-
Nesquick deal	Good	Medium to good	Bad
Vulnerabilities	-	Price gap between affordable and premium dairy products (no/low tariffs and trade facilitation)	Inability to compete with cheap bulk imports (no/low tariffs and trade facilitation)
	Medium-risk gamble	Medium-risk gamble	High-risk gamble

It may be concluded that African dairy business is not for the risk averse. Particularly fundamental political instability of the 'Dutch disease catching dairy' scenario would undermine dairy business in general. It should however be noted that this outlook takes less extreme forms for non-resource rich countries such as Rwanda, Uganda and Ethiopia (Punam and Ferreira, 2014). Given that insecurity and instability associated with the resource curse may well spill across borders, this future scenario still applies. The other two scenarios are nor implausible for West Africa, neither for East Africa. However, that does not mean that they are equally plausible. Bearing mind the protectionism against dairy imports yet observed in the EAC, the 'Hitched to the African wagon' scenario may be more plausible in East Africa. On the other hand, the 'Nesquick deal' scenario – factually almost the mirror image of the 'Hitched to the African wagon' scenario – would be more

plausible in West Africa. In this light, connecting the available strategies to regional differences allows for concluding that in general:

- Trade in and/or reconstitution of powder imports is the most robust strategy in West Africa
- Milk reconstitution is reasonably robust in those East African countries that are not directly associated with natural resource abundance
- Local production is most promising under current East African conditions, but at the same time still highly risky.

None of the strategies is robust across all possible scenarios. However, there are possibilities for strategic adaptation so as to increase the chance of success. Combining multiple strategies is key to survival. As also stressed by (Fontagné, 1999), foreign investment in local production and trade are complements, not substitutes. Shifting the balance between dairy trade and setting up local milk production in response to the actual unfolding of the future.

6.2 COUNTRY-BY-COUNTRY BUSINESS DEVELOPMENT STRATEGY GUIDE

Imagining what the future might hold helps to decide whether to invest, but is not enough to unlock the paralysis. Given that regional differs matter, those daring to requires further support regarding the second half of the focal decision, i.e. "*if [investing] so, where and how?*".
The possibility and chance of successful implementation of the available approaches have been assessed in the light of import tariffs, complexity and delays associated with moving dairy products across borders, logistics connectivity, climate, cost price of locally produced milk, and the cold infrastructure for collection and processing. Criteria have been selected on the basis of The values assigned, which jointly determine the relative position of the arrow, reflect current conditions and can be found in appendix G. Thus, although in all countries a balanced strategy is required for doing dairy business, no single balance exists that is appropriate for all. Moreover, the balanced approach that drives success today may be less promising tomorrow (see paragraph 6.1). From figure 16 it may be concluded that under the current circumstances the balance tends more towards trade for West African countries – implying greater reliance on dairy imports – whereas East African demand is likely to be fulfilled for a much greater part by milk sourced locally.

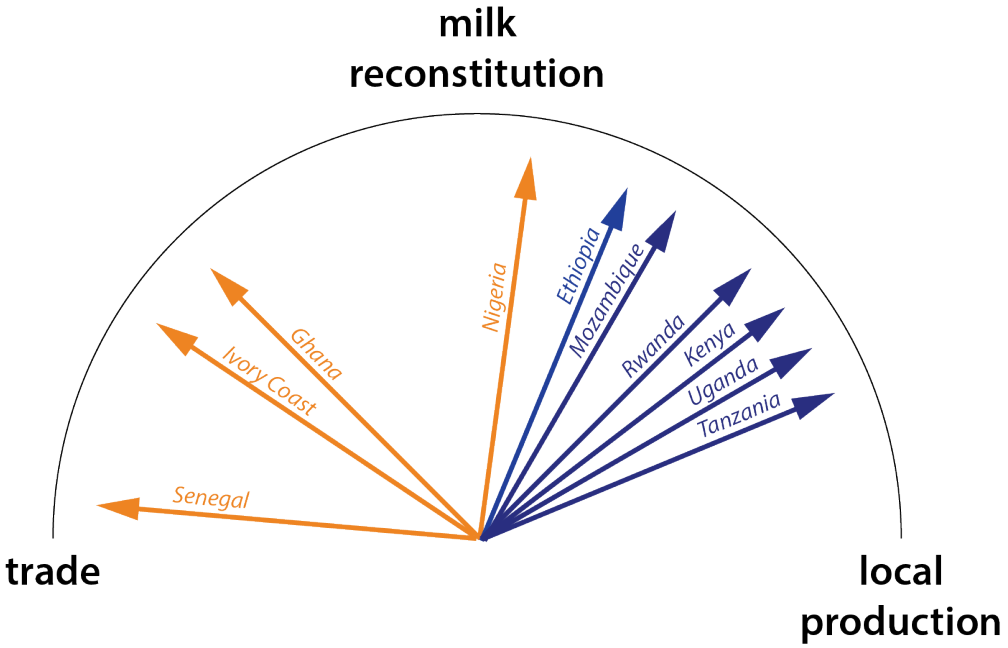


Figure 16 - Country-by-country business development strategy guide

6.3 SELECTION OF LEADING INDICATORS AND SIGNPOSTS

Those daring to invest despite the high-risk profile of investment in African dairy business can anchor their country-specific strategies in the guide presented in figure 16. However, as urged in paragraph 6.1, strategies drawn up today need to be adapted as forks in the road appear. Prepared-ness to adaptation requires continuous monitoring practices. Paragraph 2.1.4.3 explains how targets for monitoring have been selected. The following leading indicators deserve particular attention of investors:

- Jumps or cuts in tariff profiles, in the light of the following trends:
    - Consolidation of existing regional trade agreements, thereby enlargement of existing customs unions and free trade areas (e.g. progress towards the announced merger of the three unions EAC, SADC and COMESA)
    - The rise of a "can-do" attitude among African governments, who start introducing dairy sector growth and transformation agendas to raise their self sufficiency
- Allocation of private capital by African investors into the dairy industry of specific countries, which would a sign that the belief in commercialisation is shared by those with experience in African business
- Number of supermarkets that open and survive, as well as the frequency of empty shelves intended for dairy products
- Large scale food scandals, as they are associated with desire for stricter monitoring and control by public authorities in developed countries, which in turn comes with additional cost and delays of inspection procedures attached
- Remarkably large dairy trade flows going reported, as this could indicate the emergence of new strategic trade routes to market
- Discovery of new reserves as well as the closing down of operations in the oil, gas and mining industry in Sub-Saharan Africa, plus the size of inward FDI by these companies – particularly targeting infrastructural development – and their expatriation and repatriation plans.

6.4 BANKING OPPORTUNITIES FOLLOWING FROM DEVELOPMENT OF AFRICAN DAIRY BUSINESS

As explained in paragraph 2.4.1.4, conducting scenario interviews sets the scene for bringing future plans of corporate clients, regardless of their concretion, to light. This allows for identifying derived banking business opportunities. Table 5, although not exhaustive, provides an overview of how Rabobank International could financially support African dairy business development.

Of the banking opportunities mentioned in table 5, supplier finance deserves special attention. This product belongs to the group of solutions called Supply Chain Finance (SCF). The rationale behind these products is to leverage the creditworthiness of large corporations for improving access to affordable liquidity, thereby helping small-scale suppliers to sidestep restrictions in their conventional lines of credit (Demica, 2011).
The penetration of SCF is yet very limited and insofar provided, coming from global development banks (Steeman, 2014). Acknowledgement of the increasingly pan-regional supplier base of food corporates as well as their mutual dependency directly implies acknowledgment of a growing demand for SCF. To keep up with business development of clients, Rabobank would need to drastically expand and diversify its range of SCF products. As small-scale suppliers of today may be creditworthy clients of tomorrow, financial innovation is fundamental to enlarge Rabobank's business base.
Given the lack of awareness about SCF advantages among SMEs, progress in the SCF market will only gain momentum unless financiers themselves are actively marketing these financial products

(Demica, 2011), but there are some hurdles to be overcome. In addition to guarantees from a creditworthy corporate, banks require transactional transparency between buyer and supplier, which is effectively absent in the lengthy and largely informal African dairy chain. The difficulty in obtaining comprehensive and reliable information already makes partner banks in East Africa less willing to provide credit and financing without collateral. Those external clients aiming so set up local production should be aware of the fact that helping their small-scale suppliers and farmer cooperatives develop increased financial transparency is a very crucial first step in increasing their access to capital goods and working capital, thereby their growth into more professional milk producers. If Rabobank manages to design SCF solutions that accommodate the needs of agricultural SMEs in developing countries, this could help enlarge the banks' business base.

Table 5 - Overview of banking opportunities

DEPARTMENT	BANKING OPPORTUNITY
Trade & Commodity Finance (TCF)	Short term commodity finance products, such as on-ship finance and country-risk coverage Medium/long term commodity products, such as warehouse financing

Export Finance (EF)	Financing capital goods and – if operated by existing corporate clients – working capital for:
	• Farm inputs (e.g. feed mills, cows)
	• Cold chain infrastructure, particularly refrigerated trucks and MCCs
	• Processing equipment, particularly
	  ○ For drying operations in Uganda (i.e. powder plants)
	  ○ For processing raw milk into UHT in East Africa
	  ○ For producing booming retail products such as spoonable yoghurts, and flavoured (powder) milk drinks in entire Sub-Saharan Africa
	• Packaging equipment, particularly for repackaging activities of bulk imports in West Africa

Mergers & Acquisitions (M&A)	Financial services related to: • Acquisition of brands and/or entire processing facilities • Acquisition of shares in African dairy market players • Joint ventures with African dairy market players
Partner banks	Providing working capital for dairy farming SMEs, particularly smallholder cooperatives and individual commercial farmers, and African dairy processors Financing capital goods of African dairy companies: processing and (re)packaging equipment, investments in the cold chain infrastructure and stand-alone energy systems
Other departments	Infrastructure finance related to improvements of West African ports that serve as logistics hubs (see chapter 3) Supplier finance to corporate clients that aim to include smaller local suppliers in their set up of local production Rabobank Foundation could support the flow of milk to MCCs by providing simple equipment such as milk cans and bicycles to smallholders

7. CONCLUSIONS AND RECOMMENDATIONS

In this chapter, it is time to return to the research questions as presented in paragraph 1.5. The combined approach allowed for acquiring insight into the regional differences and complex dynamics that are the core of the African dairy business challenge. Paragraph 7.2 attaches some key conclusions to the decision support as summarized in the previous chapter. Paragraph 7.3 reveals how the role of the bank stretches beyond providing financial services to creditworthy clients investing in African dairy business and makes recommendations as to how to fulfil this broader role.

7.1 WHAT MAKES AFRICAN DAIRY BUSINESS CHALLENGING?

Doing business in African dairy constitutes a wicked problem. Three types of uncertainty add to its wickedness. The core of the problem boils down to the irregularity of milk and money through a value chain – inducing cognitive uncertainty. The lengthiness of this chain and the challenge of competing against the informal market players induce further uncertainty (strategic). The third dimension of the problem may be summarized as high cost and unpredictability of business-to-government interaction, which induces institutional uncertainty.

Moreover, those aiming to get involved in African dairy business are lacking knowledge. Africa tends to be evaluated as "one big country" whereas in reality the economy is heavily fragmented. Trade flows mapped reveal that regional differences matter. By 2013 a total of 10.5 million tonnes MEQ has been imported into Africa. Roughly half of it flows into the five North African countries, implying that 5.2 million tonnes MEQ flow into the 49 Sub-Saharan African countries. Zooming in on the regions allows for concluding that West Africa, while holding a similar share of the Sub-Saharan Africa population as the East African region, has a milk inflow adding up to a total volume of 2.7 million tonnes MEQ. By contrast, only 0.6 million tonnes MEQ were imported into East Africa.
Imposed and natural barriers to trade for in the 10 countries under consideration shed light on these patterns. Per capita dairy import volumes (MEQ) are higher in:

- Countries where the level of dairy import tariffs are lower
- Coastal countries.

In other words, comparing East and West is comparing cheese to chalk.

Thus, success of business development ultimately depends on the ability to cope with or reduce the many uncertainties, and the tailoring of strategy to subregions within Sub-Saharan Africa.

7.2 FOCAL INVESTMENT DECISION REHEARSED

Whether or not to invest in dairy business development in Sub-Saharan Africa and if so, where and how? Chapter 6 presented comprehensive decision support, from which a couple of conclusions follow.
Investment in African dairy business is not for the risk averse. The decision qualifies as a medium to high-risk gamble anyway. None of the available options across the spectrum of dairy business development, which ranges from direct trade in value-added products to setting up production, is robust across all scenarios. However, there are possibilities for strategic adaptation so as to increase the chance of success. The business development options are complements, not substitutes. Combining multiple strategies is key to survival. The balance between dairy trade and setting up local milk production should be shifted as forks in the road appear. Paragraph 6.3 presents a list of

leading indicators to monitor the actual unfolding of the future, which is at the basis of strategic adaptation.
Although in all countries a balanced strategy is required for doing dairy business, no one-balance-suits-all plan for investment exists. From the country-by-country strategy guide follows the conclusion that, under the current conditions, the balance tends more towards trade for West African countries, whereas the chance of success in satisfying East African demand is greater when opting for locally sourced milk. Nonetheless, drivers of success today may be less promising tomorrow. In other words, the chance of success of a particular strategy in a particular country should be frequently reviewed in the light of changing conditions.

7.3 RECOMMENDATION: ROLE OF THE BANK

Rabobank has a role to play in African dairy business development. This research project revealed that – although yet uncommon to apply scenario method across organizational boundaries and from a banking perspective – initiating but also continuing the dialogue about the unfolding of the African dairy future can substantially add to the value proposition of relationship banker. Large trade flows and sector dynamics discovered today may have disappeared tomorrow. It is vitally important not to present solely a static overview of the sector as it is, but to help navigate uncertainty in the contextual business environment on a continuous basis. Scenarios allow corporate clients to be better prepared for whatever future takes place. Talking in depth about financial risk attached to these stories in the shared objective of mitigating financial risks with their clients. The African dairy scenarios are vehicles for helping Rabobank and its clients learn. During process has turned some black swans into white, thereby allowing for better understanding of financial risks attached to business development.

The complex dynamics described in chapter 4 feed into the conclusion that corporate decision maker is dependent on other parties for making strategy work for success. Aligning interests and leveraging shared resources are quintessential steps towards reduction uncertainty. In the network economy of today, investors critically depend on each other for their success and survival. For instance, if an investors decides to build a dairy processing plant in East Africa, parallel investments in the cold chain and suppliers of affordable farm inputs are crucially needed to ensure a regular flow of milk to that newly built plant. The return on investment of separate organizations becomes heavily intertwined. Therefore, investors may be assumed to develop an interest in business *ecosystem* development as an extension to business development. In other words, clients have an interest in alignment of capital investment. The position of Rabobank is powerful in bringing them together. The scenario process could be at the basis of trust and cooperation, thereby possibly leading to self-fulfilling prophecy. The jointly constructed future, regardless of its plausibility, may cause itself to become reality, by the very spark of alignment of investments for business ecosystem development during the scenario process, due to the positive feedback between belief and behaviour. However, this relationship deserves further exploration (see paragraph 9.2). Also, it should be noted that there are several ways in which the cross-organizational scenario method could be improved in case of redeployment. Paragraph 9.1 presents an overview.

Whereas available products can already leverage some of the banking opportunities identified, further steps are urgently recommended to increase their ability to support the set-up of local milk production systems. Small and medium dairy enterprises still lack access to finance, particularly due to the lack of transactional transparency, which also hampers the gradual replacement of collateral by cash flow principles at African partner banks. Rabobank should acknowledge that taking an active part in helping potential clients in developing countries build transactional transparency provides an opportunity for enlarging the banks business base. However, the incredibly large gross capital requirement for farming to be able to feed the world by 2050 (see paragraph 8.3), renders such a proactive role more than the basis of seizing banking opportunities.

Proactively helping small and medium players develop into creditworthy clients becomes a social obligation rooted in Rabobank's vision of Banking for Food.

Lastly, as stressed in paragraph 6.4, the structural need for access to cheap liquidity within the chain – particularly to cancel out the irregularity of milk and monetary flows so threatening to progress towards formalization of the African dairy sector – implies urgent need for innovation and diversification in the SCF product portfolio. The penetration of SCF is yet very limited and insofar provided, coming from global development banks (Steeman, 2014). Acknowledgement of the increasingly pan-regional supplier base of food corporates as well as their mutual dependency directly implies acknowledgment of a growing demand for SCF (Demica, 2011). Further developing the SCF part of the financial product portfolio is crucial to meeting this growing demand.

8. DISCUSSION

This chapter discusses the value of scenarios for the global F&A sector. Moreover, the added value is reviewed in the light of three dimensions of the uncertainty associated with Sub-Saharan Africa. In paragraph 8.3, the societal relevance of the decision support is discussed. After key issues that arose during the course of research are presented, suggestions for overcoming them in future decision support exercises are put forward. Lastly, some directions for future academic research are presented.

8.1 VALUE OF SCENARIOS FOR INVESTMENT PLANING IN GLOBAL F&A

Scenarios first emerged following World War II, as a method for military planning. In the early 1970s, scenarios reached in new dimension, with the work of Pierre Wack and other planners at Royal Dutch/Shell (Schwartz, 1991). The usage of scenarios has helped the company to cope with the oil price shock and other uncertain events in 1970s (Coates, 2000; Bradfield et al., 2005). Ever since, corporate level scenario planning has increased in popularity in both Europe and the United States, particularly among large size companies in the capital-intensive industries with long planning horizons (Malaska et al., 1984; Linneman and Klein, 1983).

Global F&A increasingly resembles the industries that are associated with high proportions of scenario users. This conclusion follows from two key trends. First, whereas food processing has always been capital intensive (Morrison, 1997), today also primary production at farm level is imposing higher and higher capital requirements. The outlook of Schmidhuber, Bruinsma and Boedeker (2009) reveals that cumulative gross investment requirements for developing countries' agriculture add up to a total of nearly US$9.2 trillion over the period 2005/07 to 2050. A striking feature of the outlook is that the annual net additions to the capital stock exhibit a noticeable decline over time, i.e. that the capital intensity will be particularly high in the coming ten to fifteen years. Partly offsetting this decline is a shift towards more capital-intensive forms of production with a growing replacement of labour by capital. There are, however, marked regional differences. In Latin America, for instance, growth will be capital and productivity-based, with negative labour contributions. In Sub-Saharan Africa, by contrast, growth will be heavily labour and moderately capital based, with limited efficiency gains.

Second, transformation of the agrifood industry's structure is being observed, in particular through consolidation and multinationalization (Reardon et al., 2009; Gereffi and Lee, 2012). In other words, global F&A has become a capital-intensive industry dominated by few large size companies. But it is not just the patterns within the sector, but all the more the challenging context that is being faced that explains why scenarios lends themselves for F&A business planning more than ever before. Revenues are uncertain and at the mercy of highly volatile global food commodity market prices. This volatility equally affects the cost side. Price volatility appears in all sorts of farm inputs, such as feed and fertilizer. Moreover, the era of rapid biofuel production strengthened the transmission of energy price volatility into agricultural commodity price variation (Hertel and Beckman, 2012). Add to that the increased frequency of supply shocks due to climate change and it becomes evident that financial risks of F&A business are on the rise. The future is uncertain. Nevertheless, in spite of these profound and partially irreducible uncertainties and serious potential consequences, strategic business decisions have to be made (Walker et al., 2003).

In conclusion, the added value of scenarios in preparing for investment is not limited to the exemplary case of African dairy. No matter what future of our global food system takes place, companies are more likely to be ready for it – and influential in it – if they have thought seriously about scenarios (Schwartz, 1991). Opportunities for redeployment are ample.

8.2 VALUE OF SCENARIOS FOR COPING WITH THREE-DIMENSIONAL UNCERTAINTY IN SUB-SAHARAN AFRICA

The paper of Walker et al. (2003) proposes a tool – the uncertainty matrix – for identifying and characterizing the potential uncertainty in model-based decision support. It suggests that uncertainty is a three dimensional concept defined by: the location in the analysis, the level of uncertainty, and the nature of the uncertainty. This matrix has been applied to dairy business development in Sub-Saharan Africa (see table 6) to evaluate whether all uncertainties have been adequately addressed during the decision support exercise.

Table 6 - Uncertainty matrix (Walker et al. 2003) applied to dairy business in Sub-Saharan Africa

		LEVEL			NATURE	
LOCATION		STATISTICAL UNCERTAINTY	SCENARIO UNCERTAINTY	RECOGNISED IGNORANCE	EPISTEMIC UNCERTAINTY	VARIABILITY UNCERTAINTY
Context	*PEST representation*		X			X
Model	*Model structure*					
	Technical model					
Inputs	*Driving forces*		X			X
	System data	X			X	
Parameters						
Model outcomes				X		X

Uncertainty is not simply the lack of knowledge. By general definition, uncertainty is any deviation from the unachievable ideal of completely deterministic knowledge of the relevant system, of which discrimination among three dimensions is possible.
With regards to the **location**, uncertainty in African dairy business development manifests itself predominantly

- In the *context*, as defining system boundaries proved ambiguous. While public and private responsibilities become ever more intertwined and public-private initiatives proliferate, the distinction between external factors and means becomes blurred. This ambiguity alters the framing of the business challenge. Is the role or contribution of African governments actually part of the problem or can the decision-makers take over?
- In the *inputs*, about both
    - *Driving forces* (see paragraph 5.1), their magnitude and system response induced
    - *Systems data* that 'drive' the model and quantify relevant features such utility infrastructures and trade flows.
- In the *model outcomes*, caused by the accumulation of uncertainties in the above locations. In other words, the sum uncertainty is greater than its parts. As stressed by Asiedu (2002) the continent is perceived as *inherently* risky. Research of Haque, Nelson and Mathieson (2000), confirmed that African countries are being rated riskier than warranted by the fundamentals.

With regards to the **level**, uncertainty in African dairy business development manifests itself along the entire continuum of uncertainty.

- *Statistical uncertainty* has been observed for example in association to trade data due to imprecise, inaccurate or opaque reporting (see paragraph 2.1.4.2 and 2.1.6)
- *Scenario uncertainty* given that the use of scenario planning implies making assumptions that are not verifiable. In African dairy business, there is a wide range of possible outcomes but at the same time the impossibility of formulating the probability of any one particular outcome (economic performance) occurring. While the majority of experts involved in the ranking procedures singled out the same driving forces, the difficulty they experienced in

coming to this conclusion – notwithstanding the measures taken to ease up ranking – reveals that uncertainty also existed about which contextual developments where actually relevant for the eventual success of business development. Continuous black outs threaten the food processing industry. Notwithstanding that supply unreliability is plausible, the frequency and duration of distortions cannot be expressed stochastically. After all, it is not solely technical failures but also interferences of electricity thieves and corrupt politicians that cause blackouts.

- *Recognised ignorance*, i.e. fundamental uncertainty about functional relationships being studied, which can be further divided into reducible ignorance and irreducible ignorance. The former category applies for example when:
    - Conducting further research can resolve ignorance; trade mapping and interviews, for example, allowed for achieving a better understanding of the relationship between dairy import volumes and tariff profiles in Sub-Saharan Africa
    - Actual developments – i.e. time will tell – can resolve ignorance, such as with the question whether classical assumptions (i.e. responsiveness of dairy demand to rising incomes) hold for the Sub-Saharan Africa region.

  With regards to some relationships (e.g. causes of civil unrest and political tensions, disappearance of fasting practices, degree of opportunism among dairy farmers and traders, the emergence of illegal road blocks, whether and to what extent the Dutch disease effect would hamper domestic dairy sector development) neither research nor development can provide sufficient knowledge.

With regards to the **nature**, uncertainty in African dairy business development is both due to imperfection of our knowledge as well as due to the inherent variability of phenomena being described. In Sub-Saharan Africa, the practice of collecting and sharing is less institutionalized than in developed countries. Consequently, epistemic uncertainty is reflected in the decision support. Insofar collected, data may be inaccurate. Data may be incorrect and incomplete due to corruption and the existence informal markets. The system diagram, the tool for evaluating complex dynamics in the dairy sector, involves a high degree of simplification, therefore imperfection.
Variability uncertainty is equally prominent. The inherent randomness of weather shocks does heavily influence milk production at farm level as well as spoilage throughout the chain. At micro-level human behaviour - of, for example, border officials, subsistence farmers and petty traders - does not follow standard patterns. At macro-level, societal processes are highly chaotic and unpredictable. Surprises may result from rapid dissemination of new technologies, particularly because Africa has shown the ability to skip several intermediate stages of technology.

What conclusions follow? Decision-makers in the face of uncertainty should not hope or expect to eliminate undesired impacts. Ultimately, their goal should be to reduce them (Dewar, 2002). Many different approaches are used in practice to cope with uncertainty. Walker et al. (2003) state that it is useful to try to match the approach to the level of uncertainty. The more one moves to the end of the scale associated with deep uncertainty, the stronger the situation calls for robust plans – which will succeed in a variety of situations – (Lempert and Schlesinger, 2000) or adaptive plans – which can be easily modified to fit the situations encountered (Walker, Cave and Rahman, 2001).

Are scenarios valuable in coping with the types of uncertainty identified? Table 6 shows that much of the uncertainty lies with the context, the input of driving forces and how these uncertainties are multiplied throughout the chain of causal effects within the 'black box' of the African dairy sector. These uncertainties manifest themselves at a level more towards the ignorance extreme. Their nature varies over space or time in a manner that is beyond control. Scenarios are well suited to the African dairy case because:

- Thinking through "what-if" stories brings each person's unspoken assumption about what is (partially) within and beyond control to the surface, thereby helping to reducing the *context* ambiguity
- Listing external driving forces, exploring their magnitude and the sector's response reduces *input uncertainty*.
- Providing a context for thinking clearly about the impossibly complex array of factors that affect any decision, the recognized ignorance about ultimate outcomes is reduced insofar possible.

Moreover, scenarios yielded the insight that African dairy business qualifies as a medium to high-risk gamble anyway. Instead of redesigning for robustness, which would be difficult given that the options already considered cover the entire spectrum from trade to FDI, the decision support has taken the form of an adaptive plan. The proposed mixed approach features a balance than can be shifted as forks in the road appear. Hence, it may be concluded to match the level of uncertainty.
The conclusion that scenarios are valuable does not necessarily mean that they resolve all uncertainties. The matrix identified a fourth location of uncertainty: system data. This uncertainty is of a lower level (statistical) and of epistemic nature, arising due to lack and imperfection of our knowledge or the characteristics of the local dairy sector. The character of this uncertainty allows for reducing through more research and empirical efforts. Filling this knowledge gap goes beyond the scope of this research project, as this restricted access and limited data render is a time-consuming effort. Thus, the next step would be to collect system data that 'drive' the conceptual model (see appendix D.3), which can best be filled at country-level.
Beyond the levels of uncertainty covered by the matrix, i.e. beyond indeterminacy, there is a level of deep uncertainty or *total ignorance*. At this level, scenarios are of limited use. After all, this uncertainty is about things we do not even know that we do not know, thereby beyond the capacity of imagination and "what-if" thinking. Nevertheless, through the cross-organizational set up of the scenario planning exercise, may have turned more black swans to white than would otherwise have been the case. Black swans nevertheless remain. Recent examples are available. Unknown animal diseases have eradicated complete herds of imported quality dairy cattle (*external client*, personal communication, 27 March 2015). Political conflicts and terrorist attacks continue to come by complete surprise.

In spite of the black swans and continuous imperfection of our sector knowledge, decisions have to be made. In conclusion, scenarios as well as the strategy guide match with the characteristics of uncertainty inherent to African dairy business. Thus, they will prove of added value in making the step from circling around the continent to actual investments.

8.3 SOCIETAL RELEVANCE

Why has Africa become a net food importer? Can Africa feed Africa? How to Feed the World in 2050? These questions are only a few of the central themes of conferences and reports by the United Nations. Rabobank recently (June 22) hosted the international conference "The Future of Farming and Food Security in Africa." What will the impact of corporate decisions, and indirectly of the decision support provided by this research project, be on that future?
By helping to navigate uncertainty in the contextual environment, scenarios are vehicles for learning that help in unlocking paralysis, thereby likely to result in actual capital investments. According to the FAO report by Schmidhuber, Bruinsma and Boedeker (2009), the gross capital requirement for agriculture in Sub-Saharan Africa amount to 940 billion USD over the 44-year outlook period until 2050. A wide variety of capital items is covered by this list such as, for instance in relation to the dairy sector: increase in dairy cattle, development of grazing land, investment in milk production and processing, and cold storage. Moreover, they suggest that private sources (domestic and foreign) will be the prime source of capital. The public hand can play a role either in

funding investments directly or by helping link, pool and promote private flows. Depending on the level of public engagement, these investments can help attract further private flows (crowding in) or, if too massive, replace private engagement (crowding out effects). Private public partnerships would aim at maximizing the former and minimizing the latter.
Relevant is, however, not merely that capital is invested but also that it is done in sustainable manner that helps alleviating food insecurity. Given the high levels of rural poverty in Sub-Saharan Africa, inclusion of smallholder farmers in dairy sector development is of crucial importance. Even though the responsibility for fostering inclusive economic growth lies predominantly with African governments, this research project has generated insights regarding the way in which a bank and its creditworthy corporate clients can jointly take up part of this responsibility.

9. RECOMMENDATIONS FOR REDEPLOYMENT AND FUTURE RESEARCH

As becomes clear in paragraph 2.3.3, several adjustments have been made to the traditional scenario approach so as to better match the research setting. This chapter discusses several issues that arose during the implementation of this adjusted approach and sums up points of improvement in case of redeployment. Moreover, some more general directions for future academic research are presented.

9.1 KEY ISSUES AND IMPROVING THE DECISION SUPPORT EXERCISE

Most of the key issues that arose during the course of the research project were related to the cross-organizational set up and associated requests for ranking of the scenario planning exercise (see paragraph 2.3.4). The feature of the focal decision not being made from within but by entities across a number of organizations, may be associated with the opportunity to triangulate future beliefs. However, the group of actual participants was in the end smaller and less diverse than initially aimed for. The reason is twofold. On the one hand, participants were not merely spread over multiple organizations, but also scattered across different time zones of the globe. Given the strategic nature of the focal decision, the required participants are generally relatively high up in the hierarchy and have busy schedules. Taken together, this rendered it impossible to organize a scenario workshop. Instead, the scenario planner has organized internal meetings, visited external clients and conducted many conference calls (see appendix H). This turned the exploration of driving forces and the ranking procedures extremely research intensive.
On the other hand, due to the stormy waters the global dairy sector is in today and the strategic weight attached to the Sub-Saharan Africa region, some participants were willing to share only a limited part of their belief.

Although this research set up provided some clear advantages – inspiration from others allowed for indirect crosspollination while providing plenty room for bringing participants unspoken assumptions and beliefs to the future, and prevention of rapid divergence of beliefs cancelling out imagination – several recommendations can be made for redeploying the cross-organizational scenario planning set up in the future.

- Framing the focal issue as sector or business ecosystem development rather than business development
- Designing some scenario *workshop* elements into the approach, as even a slight step away from full iteration would allow for making it the process less resource-intensive, which moreover could help to:
    - Reduce ambiguity and facilitate the grouping of driving forces
    - Make scenario steps less resource-intensive
    - Directly incentives participants to align their interests and initiatives, thereby facilitating business ecosystem development
    - Reduce the delay between dialogue and ranking procedure
    - Ensure correct and shared understanding of the ranking procedure.

  Linking some workshop to an already planned gathering of stakeholders (e.g. conference) would ease the mobilization of participants.

Further issues arose in relation to the ranking procedure (see paragraph 2.3.3.2). As a result, the procedure did not yield the intended benefits. The idea was that adding a classification of uncertainty and impact in absolute terms would (1) increase awareness of the inherent variability

associated with the African continent and (2) provide an incentive for participants to ensure greater thoroughness and consistency in filling out the table. Unfortunately, the request for additional classification in absolute terms yielded only a partial response. Moreover, because of the freedom granted to the individual participants to draw the line between high and medium and between medium and low – in other words, the lack of well defined intra-personal classification – translation of these individual classifications into an aggregate pattern would not be meaningful. In brief, these absolute classifications, insofar received, have been useful solely to check for consistency, thereby the careful work of participants in filling out the tables.
The design of the ranking request could be improved so as to increase the chance that response is received in full and on time. A point of improvement lies with formulating the request more polite yet forceful (e.g. 'please provide' instead of 'it would be very much appreciated if you could provide'). Moreover, introduction of a shared definition of the dividing line between 'high' and 'medium' and between 'medium' and 'low' would ease up interpretation by the scenario planner, thereby allowing for meaningful translation of individual classifications into an aggregate pattern.

9.2 NEXT STEPS TO IMPROVE SCENARIO RESEARCH

Following this African dairy case study, the three next steps for academia would be:

- Analysis of the potential and prospects of the cross-organizational set up, in particular whether, if redeployed from a banking perspective, the scenario process could form basis of trust and cooperation, thereby ultimately lead to a self-fulfilling prophecy (see also paragraph 7.3)
- Review of the use of scenario methods in the changing landscape food and agriculture, including evidence of impact on spurring the capital investments needed.
- Exploration of possibilities for proper integration of corporate social responsibilities (see paragraph 10.1) in the decision support in order to prevent scenarios from reinforcing the tendency of taking the blinkered, economic view on the focal decision.

10. REFLECTION ON RESEARCH PROJECT

I would like to use this chapter to reflect both content and execution of this research project. Particular attention is devoted to choices made regarding scope and implications thereof for the ultimate decision support. Moreover, in due course of the research project, I reckoned that there would have been room for further improvement. Two key lessons have been drawn, one related to distinguishing the fundamental from the peripheral, the other related to the tension between feasibility and specificity.

10.1 SCOPE AND CORPORATE SOCIAL RESPONSIBILITY

The controversy surrounding the expansion of multinationals into the African dairy market has been left out of the scope of this thesis work (see paragraph 1.5). Instead, the focus has been on supporting the corporate decision-maker in fulfilling its prime economic responsibility of being profitable. However, in times where corporates need a social license to operate, the choice to leave the taking up of legal, ethical and philanthropical responsibilities out of account presents an important limitation of the decision support provided.
Notwithstanding moral concerns expressed during the majority of scenario dialogues with participants, the driving force *public opinion regarding adverse effects of globalization and trade liberalization* ended up bottom-ranked (see appendix F.3). In other words, while many reckon the existence of additional corporate social responsibilities when expanding into the continent with the majority of world's least developed countries, priorities are skewed to anticipate macro-environmental trends that more directly affect economic performance.
In the scientific article accompanying this thesis (Sonneveld, forthcoming) I address the structural weakness of the scenario methodology in integrating corporate social responsibility. This weakness is rooted in the rule of thumb underlying scenario planning, which is that scenario drivers must be few in number in order to avoid a proliferation of different scenarios around every possible uncertainty (Schwartz, 1991). While crucial to prevent the learning process from dissipation, this rule of thumb at the same time tends to select those factors that directly affect economic performance as the critical scenario drivers. As such, scenarios constructed with the methodology as applied for business planning today reinforces the tendency of taking the blinkered, economic view on the focal decision.

10.2 FUNDAMENTAL VERSUS THE PERIPHERAL

The initial focus placed on trade facilitation in my research set up turned out to be a too hasty and biased decision. Notwithstanding the attractive simplicity of a 'data pipeline', the gap between potential and actual impact proved to be large. Excessive trade costs due to red tape and corruption imply that trade facilitation matters more to Sub-Saharan Africa than to any other region in the world. Indeed, trade facilitation measures should be thought along two dimensions: "*hard*" infrastructure and *"soft"* infrastructure (Portugal-Perez and Wilson, 2008). While the step of well-presented design of a technical artefact to imagination is easily made, the institutional reforms required for actual implementation presented a thorny path. Given the structural disadvantage and primitive facilities at the border of least developed African countries and the desire for stricter control offsetting simplification of customs procedures on the export side, experts confirmed that this would not become a driving force to dairy business development. In retrospect, acquiring insight into the dynamics of trade facilitation, which ultimately were not reflected in the scenarios, may have been at the cost of time available for thorough investigation of other driving forces.

10.3 TENSION BETWEEN FEASIBILITY AND SPECIFICITY

The reason for zooming in on ten countries was to avoid the tendency to evaluate Africa as if the continent constitutes "one big country". However, this turned out to be a severe challenge. Although the underlying reason for doing so was different – lack of understanding versus attempt to keep research within boundaries of feasibility – the result is the same. The diverging, generalizing act of drawing valid conclusions and coming up with valuable recommendations for an entire region (Sub-Saharan Africa) or subregion (East/West) nevertheless involves risk inferences. This limitation manifested itself in particular in respect to the actor analysis technique (see paragraph 2.2.3.2). The interests and dedication of an individual actor might differ substantially from those defined for the group of actor defined on a more general level. This gap may even be wider in the light of the African opportunism. Furthermore, how soon may the static result of actor analysis become out-dated in such a highly dynamic environment? How to draw up "formal chart" in situations characterized by a high degree of opportunism (absence of contracts) and limited political stability (no clear objectives, no authority with long-term power), corruption if it comes to resources? Also, the omnipresence of potential players implies that not all actors about to enter the arena have been included in the actor analysis. All in all, there is a need for critically reviewing whether the insights derived from it hold when zooming in to a particular country.

10.4 PROCESS AND PERSONAL DEVELOPMENT

Working for five months with the research department of a financial institution allowed me to conclude that I am a team worker rather than an individualist. Moreover, despite the omnipresence of quantitative issues within the operating scope of a bank, I have concluded that these are in generally unable to directly feed into my technological enthusiasm. It is the fascination for technology and technological innovation that caused me to anchor on aspects that later turned out peripheral to African dairy (see paragraph 10.2).

I am glad for having grasped the opportunity to work on a project out of my comfort zone. My passion for the future of our global food system has been the starting point of a steep learning curve. The project allowed me to acquire insight about the geopolitical field of international trade, about the challenge of (inclusive) economic growth and business development in developing countries and, above all, about Africa and how the continent is thriving in a globalized world. Working in a department with people from diverse but rarely engineering backgrounds, at the same time helped me better understand the uniqueness of the 'engineering approach' to problem solving.

My thrift towards effectiveness and efficiency has become challenged by the high degree of politics in a large cooperative organization as Rabobank is. Being an self-starter and project initiator by nature, I have learned much about taking time for aligning interests, about finding departments willing to (financially) support the execution of research projects.

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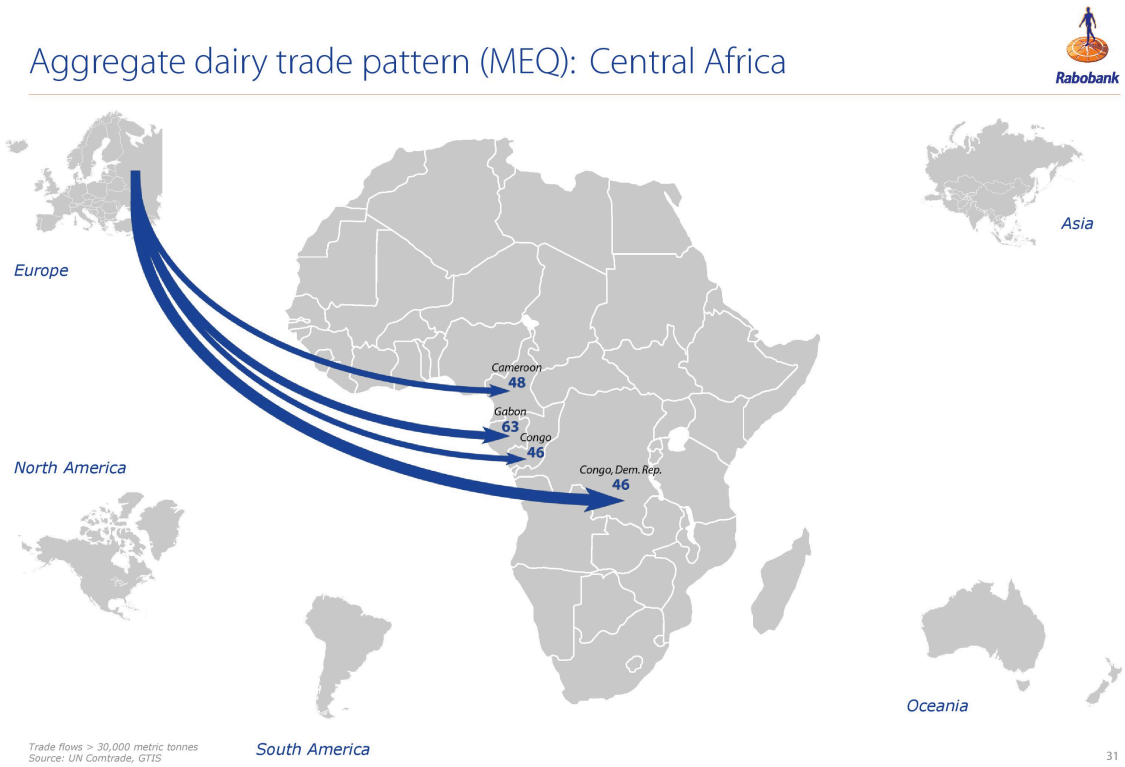
APPENDIX A – AGGREGATE DAIRY TRADE

Bearing in mind the variety of dairy products that can be processed out of raw milk, calculating the aggregate volume of dairy that flowed into the African continent by 2013 requires conversion of absolute quantities into so-called Liquid Milk Equivalents (MEQ). In doing so, the so-called combined butterfat and non-fat solid contents method for conversion has been relied upon (see paragraph 2.1). Separate trade flows have been grouped by continent of origin rather than by destination. This choice follows from the underlying objective of generating detailed insight into African dairy consumption as opposed to better understanding of expert behaviour of those with a production surplus.

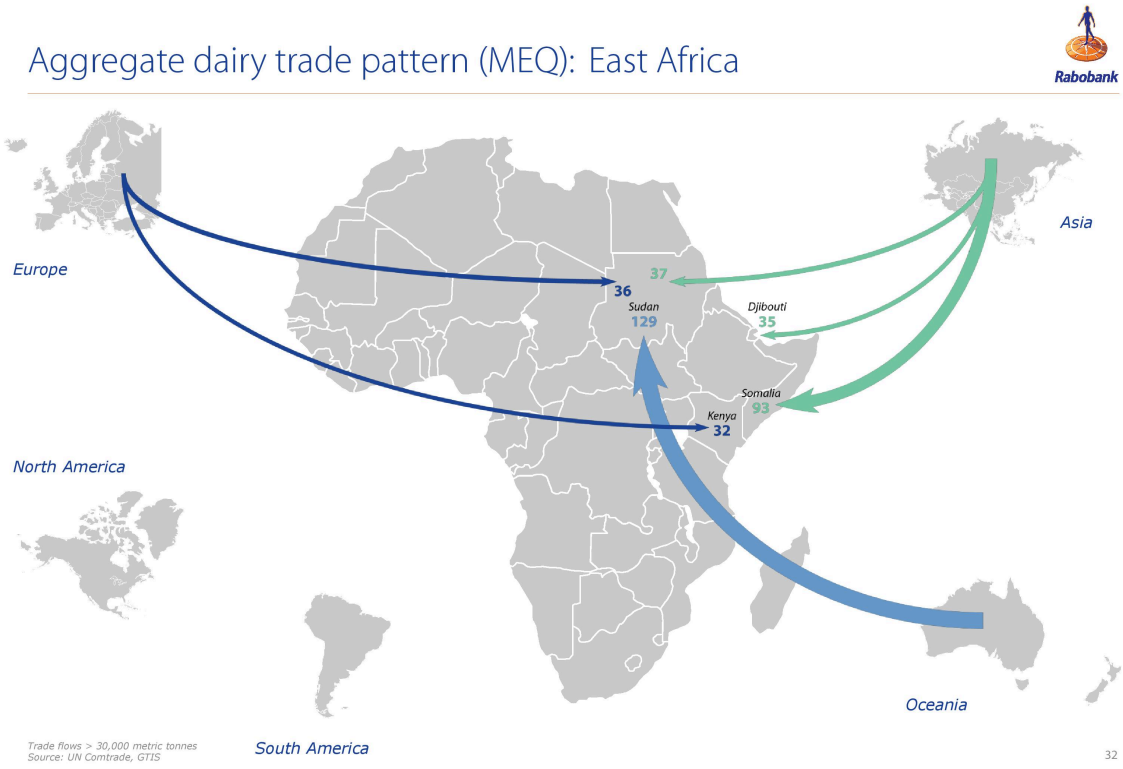
The trade maps presented hereafter increase understanding of the actual geographical patterns linking up production and consumption. The pattern covers all import and export flows to, from and across African continent of the HS codes: 0401, 0402 (subcodes 040210, 040221, 040229, 040291, 0402999), 403, 404, 405, 406, 19019011, 350110 and 350190. It should be noted that because of the impossibility of consistence in translation of quantities of infant formula into MEQ – dairy content may be zero or varies substantially – these flows are *not* included in this aggregate pattern.

A word of caution should be added. The minimum requirement for drawing an arrow into an African country, i.e. the cut-off point, has been 30 000 metric tonnes MEQ. In other words, the patterns below are not exhaustive. Countries with no incoming arrow may still be involved in dairy trade, although at a very low level.

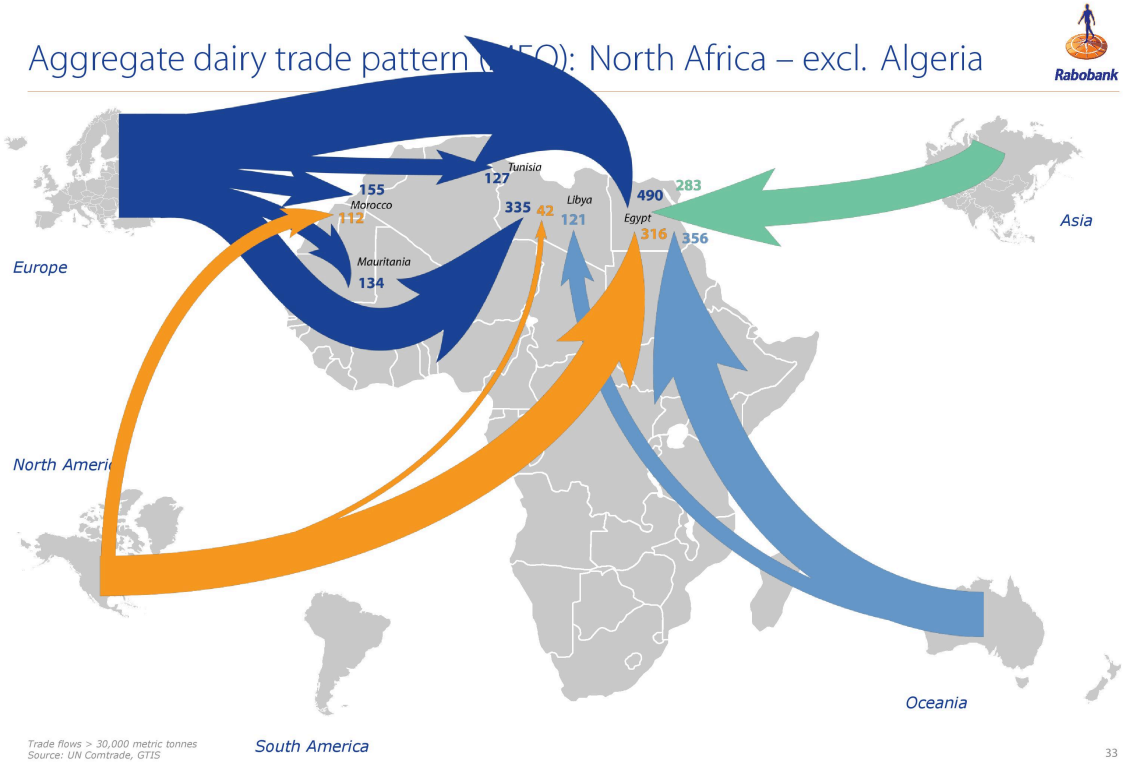
A.1 Dairy trade with Central Africa



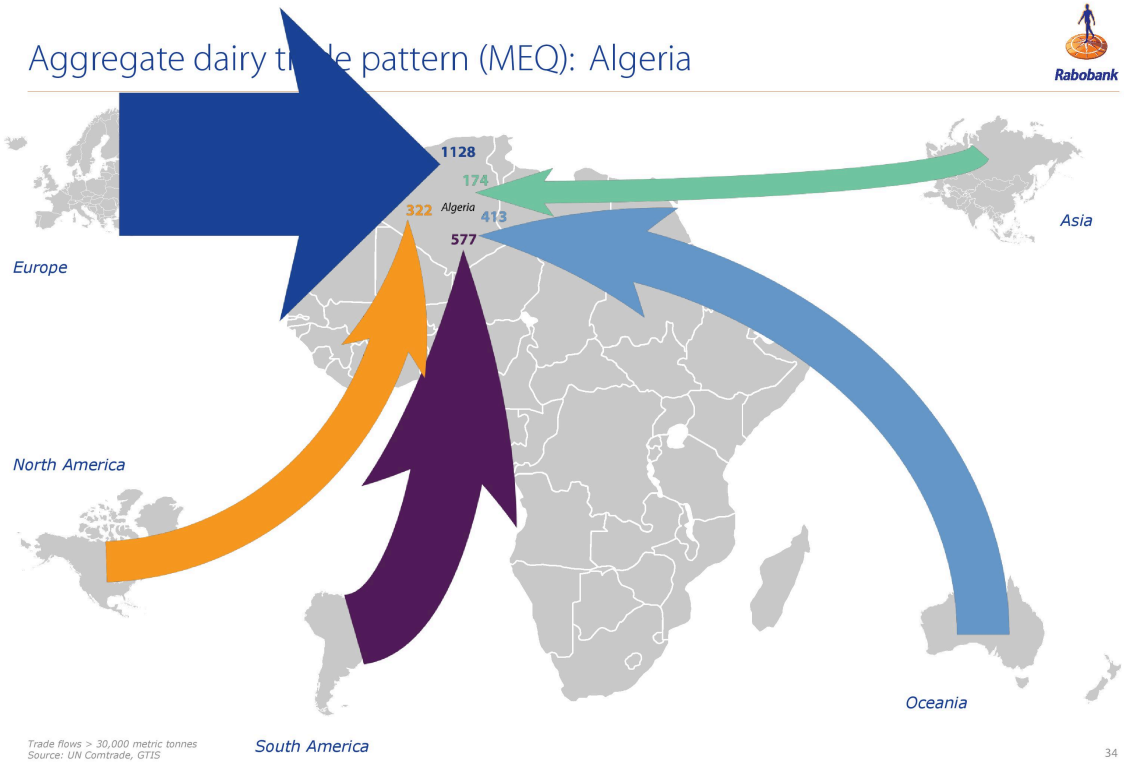
A.2 Dairy trade with East Africa



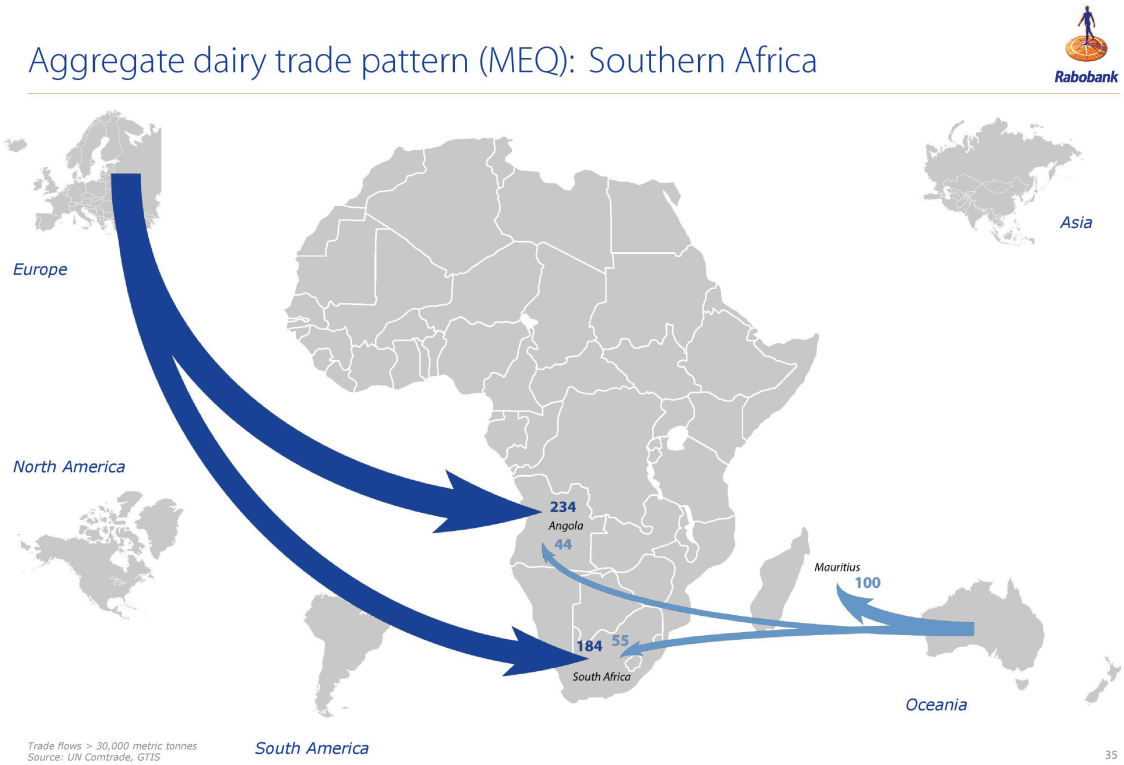
A.3 Dairy trade with Northern Africa (excl. Algeria)



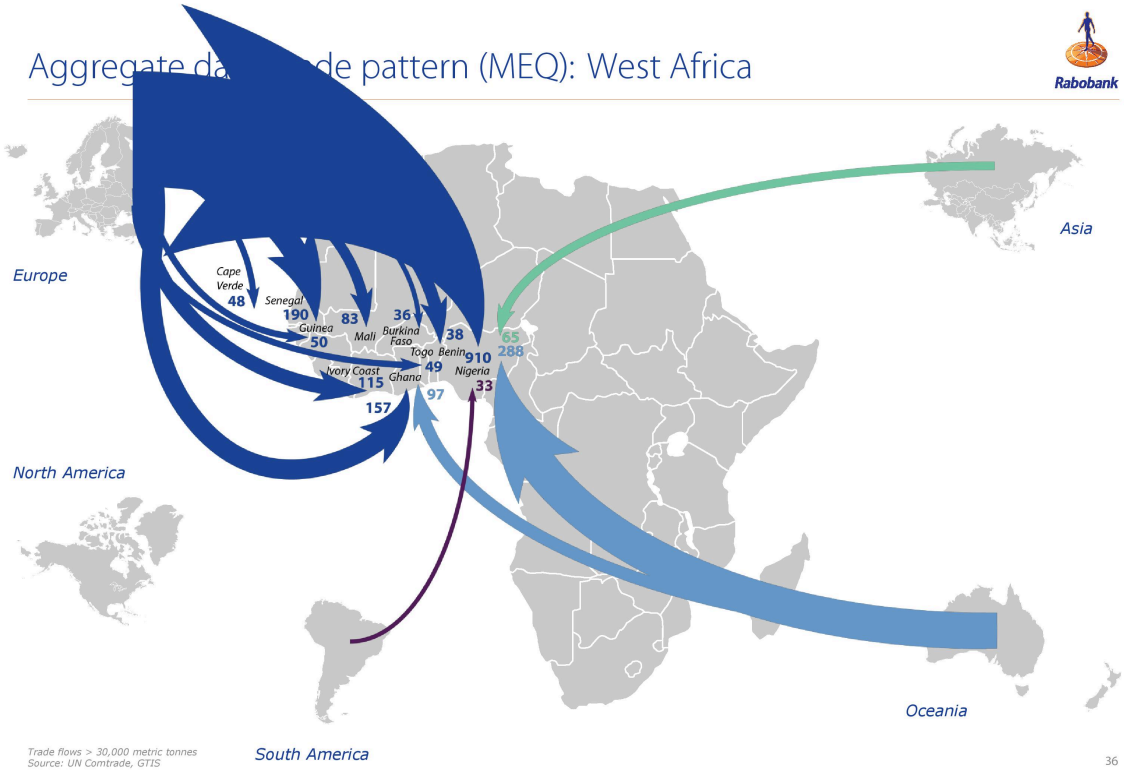
A.4 Dairy trade with Algeria



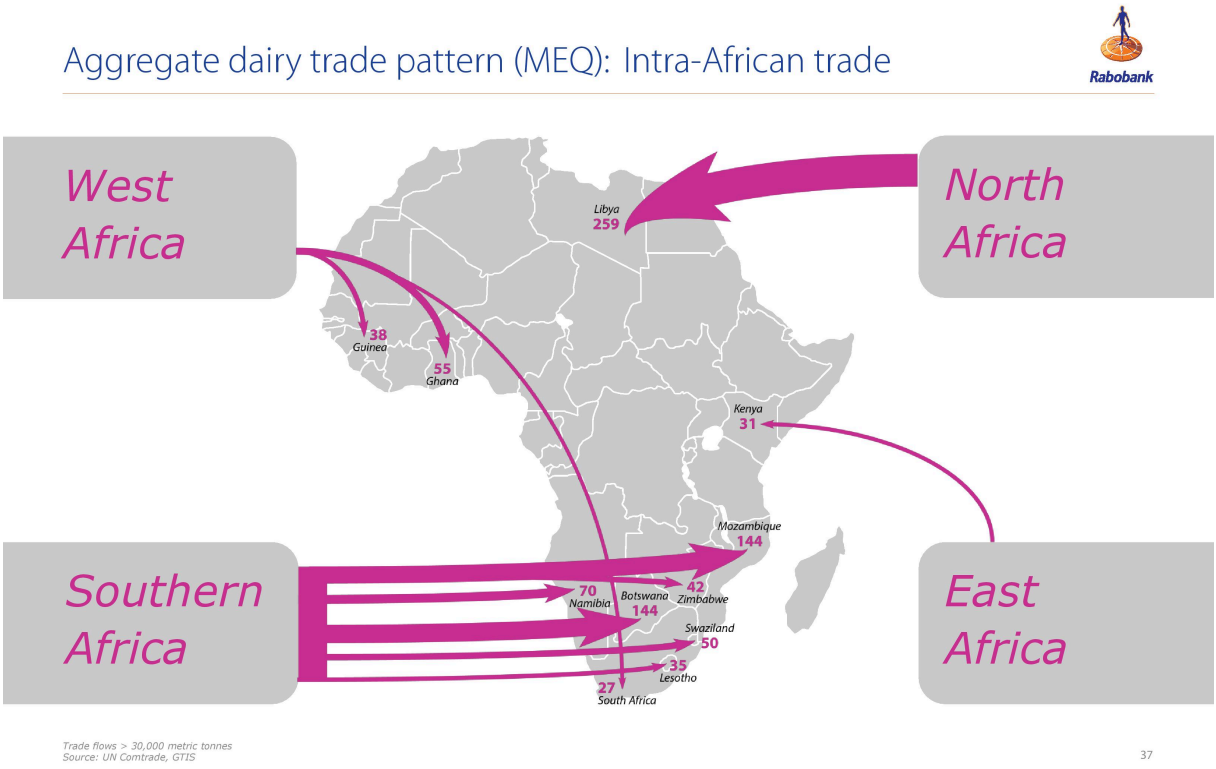
A.5 Dairy trade with Southern Africa



A.6 Dairy trade with West Africa



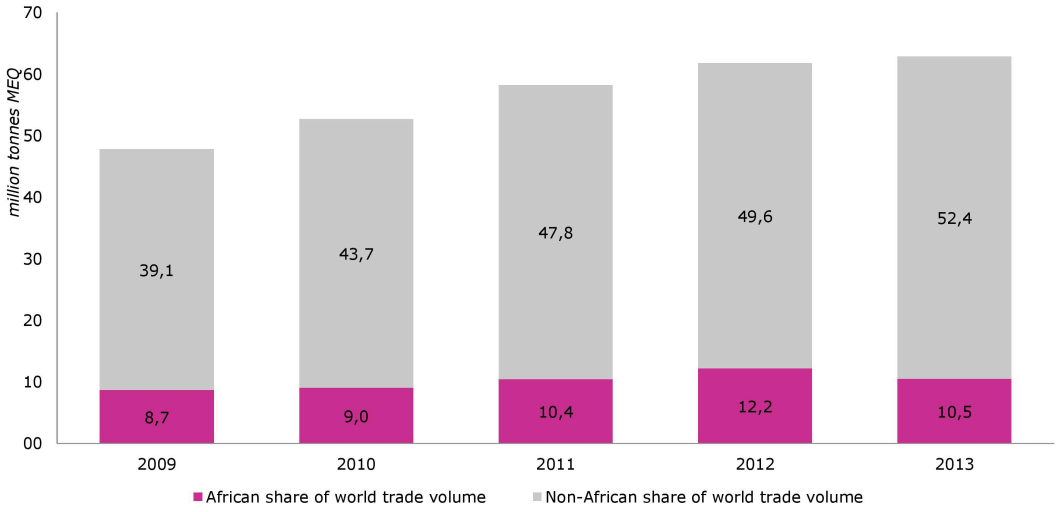
A.7 Intra-African trade



A.7 Levels of dairy trade compared: Africa versus rest of the world

African dairy trade volumes

Aggregate trade volumes, 2009-2013
Africa versus Rest of World (ROW)



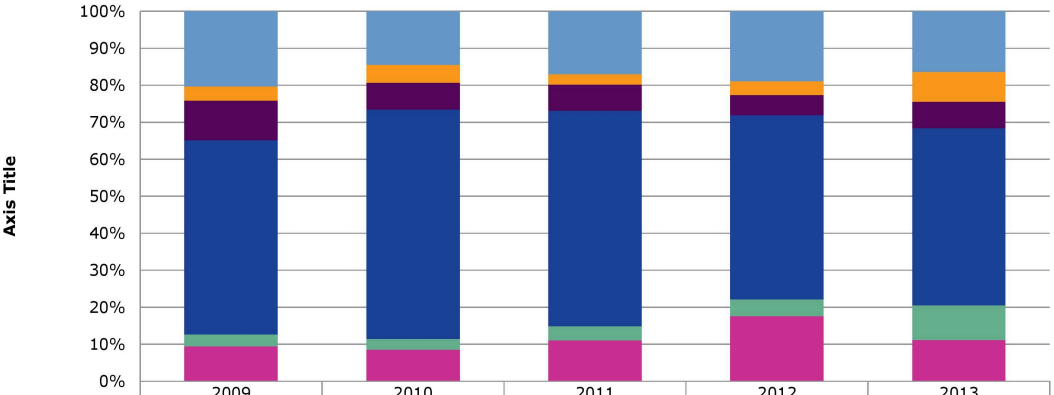
Source: UN Comtrade, GTIS

38

A.8 Origin of dairy imports into African countries

Imports into African continent

Aggregate imports volumes by origin, 2009-2013



	2009	2010	2011	2012	2013
Oceania	20%	14%	17%	19%	16%
North America	4%	5%	3%	4%	8%
Latin America	11%	7%	7%	5%	7%
Europe	52%	62%	58%	50%	48%
Asia	3%	3%	4%	5%	9%
Africa	9%	9%	11%	18%	11%

Source: UN Comtrade, GTIS

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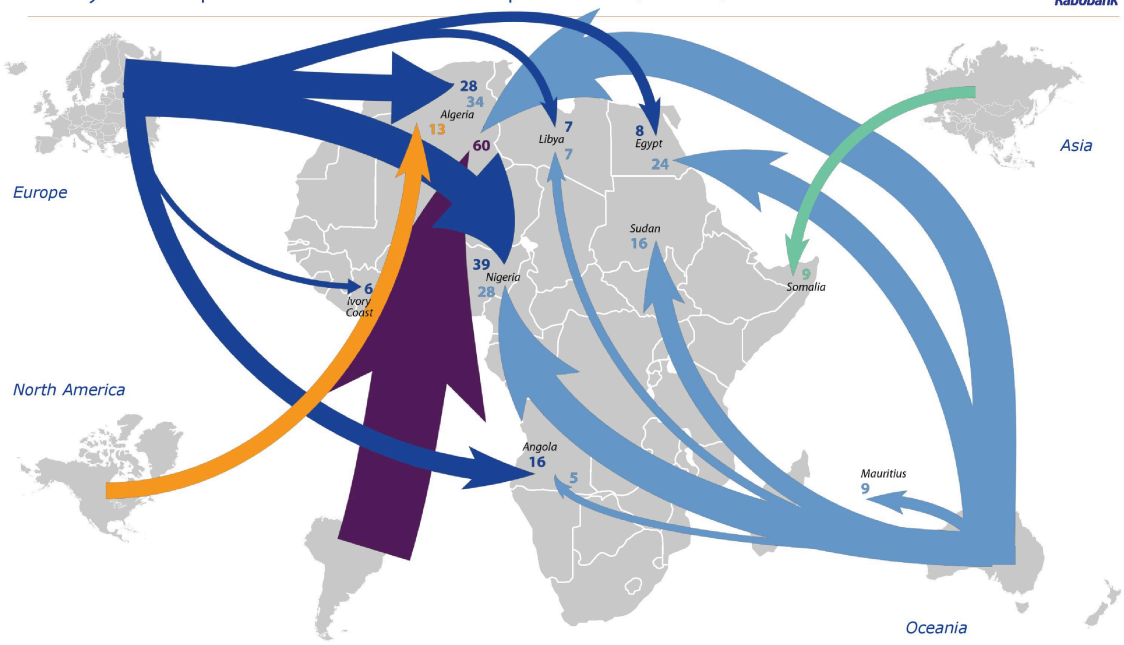
APPENDIX B – TRADE IN DAIRY PRODUCTS

Dietary patterns differ across the African region. To acquired better insight in these regional differences, trade in specific dairy commodities has been investigated. The trade maps presented hereafter present the *absolute quantities*. The HS codes from which product patterns arise are listed in paragraph 2.1.3.4. The patterns cover all import and export flows to, from and across African continent of a quantity higher than the chosen cut-off points. For whole milk powder (WMP) and fat-filled milk powders (FFMP) the minimum requirement for drawing an arrow has been 5,000 metric tonnes. For the other dairy commodities (skimmed milk powder (SMP), cheese, butter and infant formula) this minimum requirement for drawing an arrow is lower: 2,000 metric tonnes. Thus, the patterns drawn up are not exhaustive. Countries with no incoming arrow may still import the dairy commodity under consideration, but of negligible quantity.

It should be noted that the last map presents trade flows in infant formula, based on HS code 190110, not infant *milk* formula (IMF). This is because there is no globally harmonized 6-digit code that allows for consistently distinguishing infant *milk* formula (IMF) from infant formula. Moreover, the recipes of IMF products are continuously changing. This means that the actual code attached to IMF exports may vary over time as well as from trader to trader. Nevertheless, the pattern yields the insight the market of foreign infant food products, despite the Sub-Saharan African baby boom, was almost non-existent by 2013.

B.1 WMP trade

Dairy trade patterns: Whole milk powder (WMP)

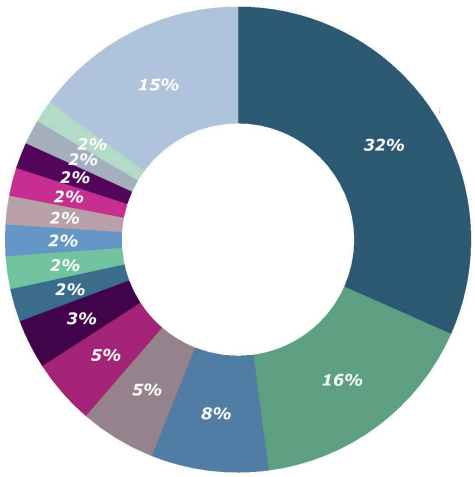


Trade flows > 5,000 metric tonnes
Source: UN Comtrade
HS code 040221

41

Destination: Whole milk powder (WMP)

Import market shares WMP, 2013



- Algeria
- Nigeria
- Egypt
- Angola
- Sudan
- Libya
- Mauritius
- Cameroon
- Somalia
- Senegal
- Ivory Coast
- Guinea
- Congo, Dem. Rep.
- Ghana
- Rest of Africa

Total volume of WMP imports into Africa

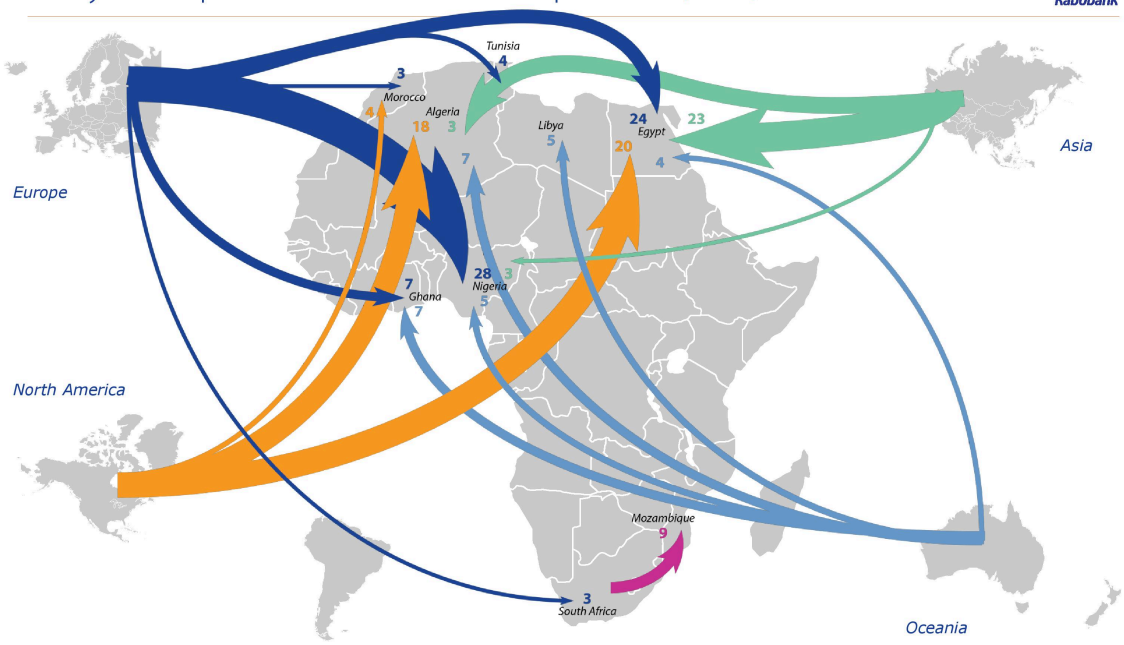
453 618 tonnes

Source: UN Comtrade
HS code 040221

42

B.2 SMP trade

Dairy trade patterns: Skimmed milk powder (SMP)

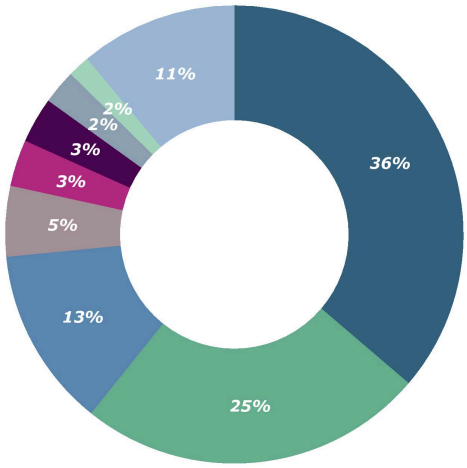


Trade flows > 2,000 metric tonnes
Source: UN Comtrade
HS code 040210

43

Destination: Skimmed milk powder (WMP)

Import market shares SMP, 2013



Total volume of SMP imports into Africa

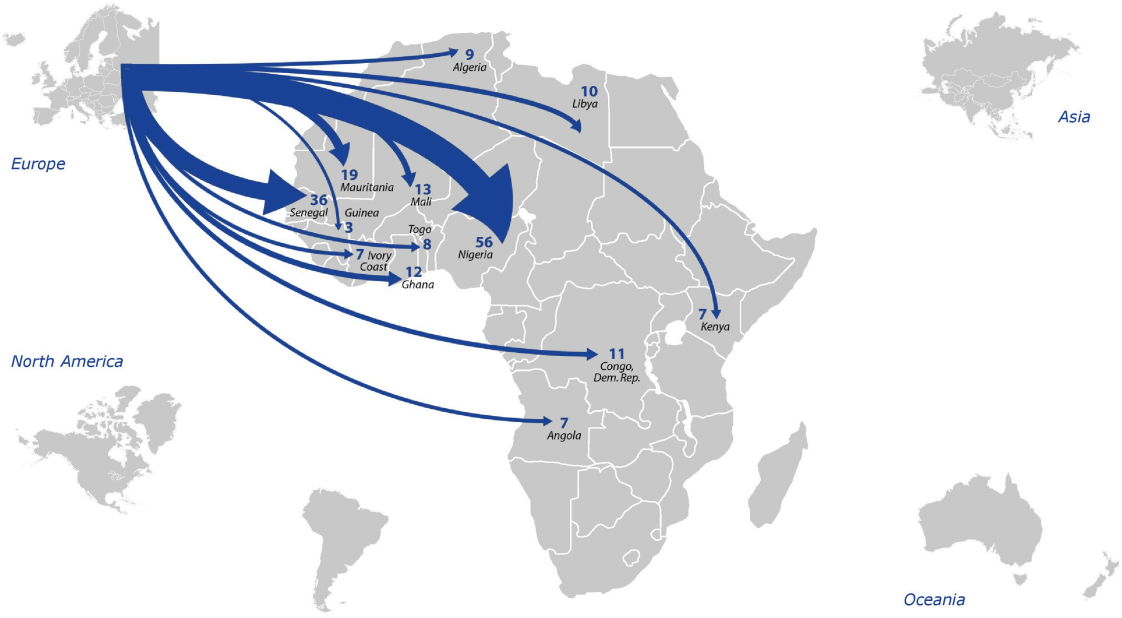
290 570 tonnes

- Algeria
- Egypt
- Nigeria
- Ghana
- Libya
- Mozambique
- Morocco
- South Africa
- Rest of Africa

Source: UN Comtrade
HS code 040210

44

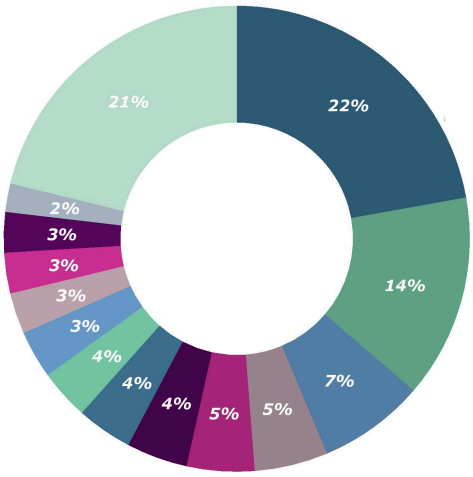
Dairy trade patterns: Fat-filled milk powder (FFMP)



Trade flows > 5,000 metric tonnes
Source: GTIS Global Trade Atlas
HS code 19019099

Dairy trade patterns: Fat-filled milk powder (FFMP)

Import market shares FFMP, 2013



- Nigeria
- Senegal
- Mauritania
- Mali
- Ghana
- Dem. Rep. Of the Congo
- Libya
- Algeria
- Togo
- Angola
- Ivory Coast
- Kenya
- Guinea
- Rest of Africa

Total volume of FFMP imports into Africa

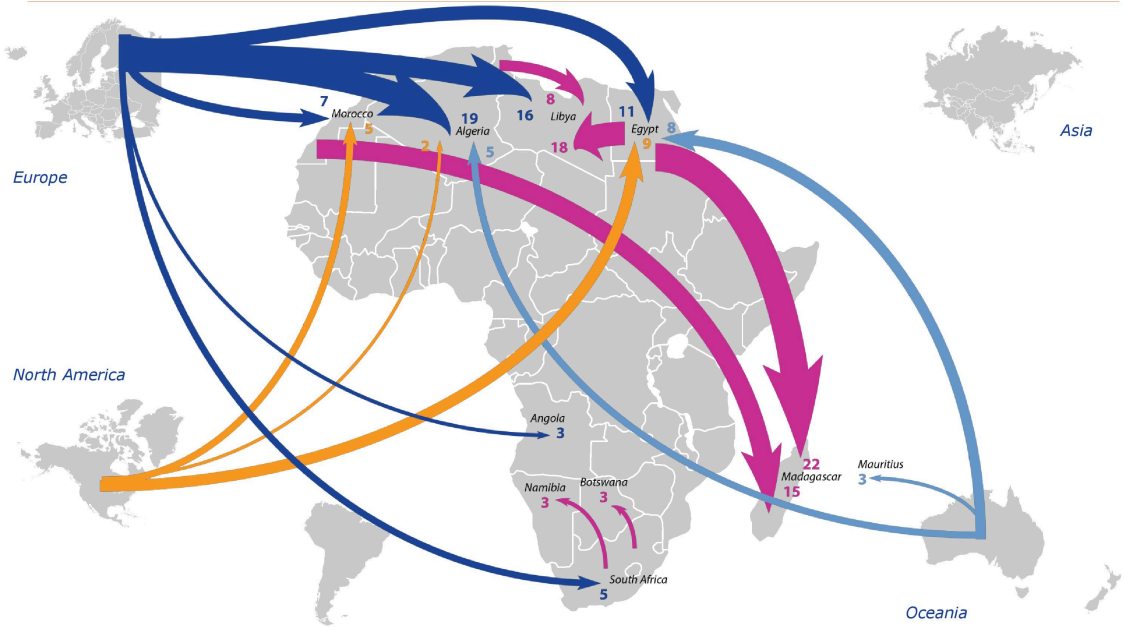
254 152 tonnes

Source: GTIS Global Trade Atlas
HS code 19019099

B.4 Cheese trade

Dairy trade patterns: Cheese

Rabobank



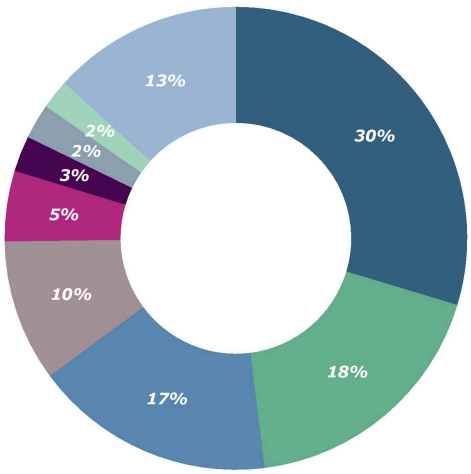
Trade flows > 2,000 metric tonnes
Source: UN Comtrade
HS code 0406

47

Destination: Cheese

Rabobank

Import market shares cheese, 2013



Total volume of cheese imports into Africa

157 190 tonnes

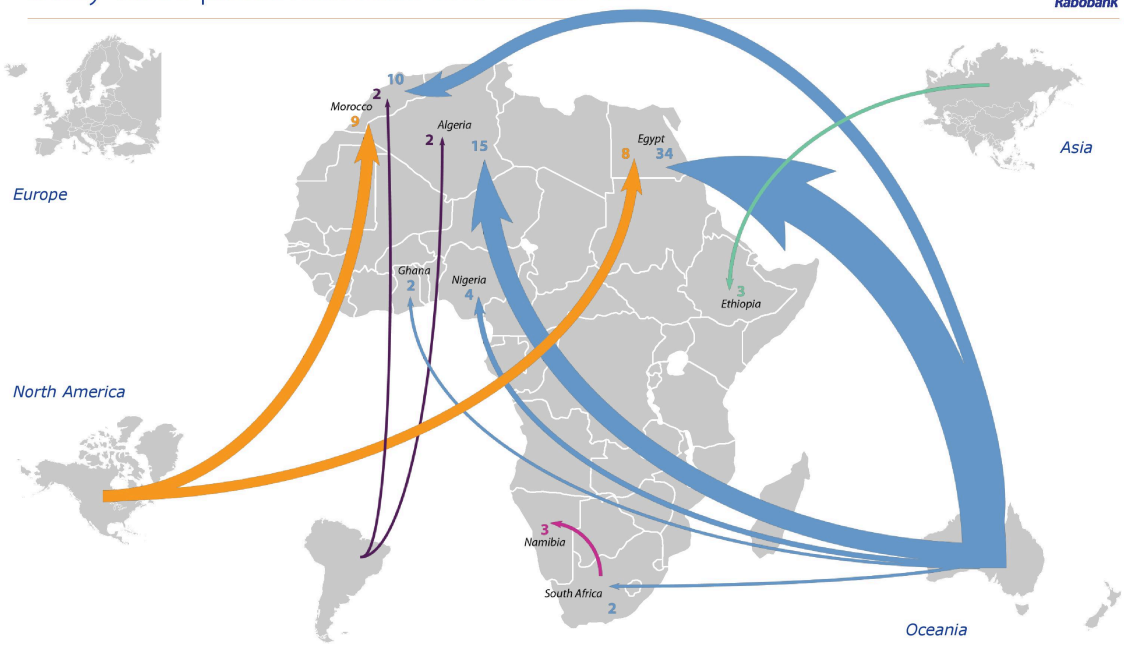
- Libya
- Egypt
- Algeria
- Morocco
- South Africa
- Mauritius
- Angola
- Namibia
- Rest of Africa

Source: UN Comtrade
HS code 0406

48

B.5 Butter and butter oil trade

Dairy trade patterns: Butter and butter oil

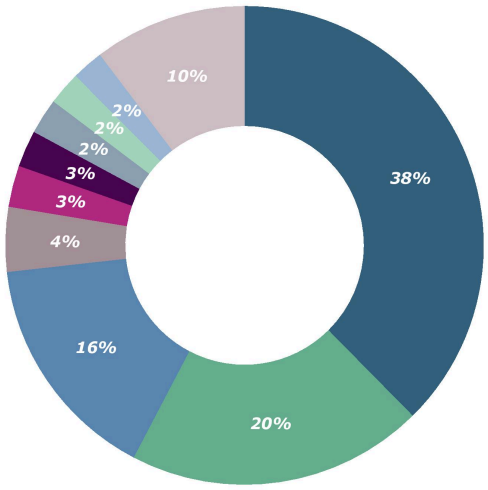


Trade flows > 2,000 metric tonnes
Source: UN Comtrade
HS code 0405

49

Destination: Butter and butter oil

Import market shares butter and butter oil, 2013



Total volume of WMP imports into Africa

120 401 tonnes

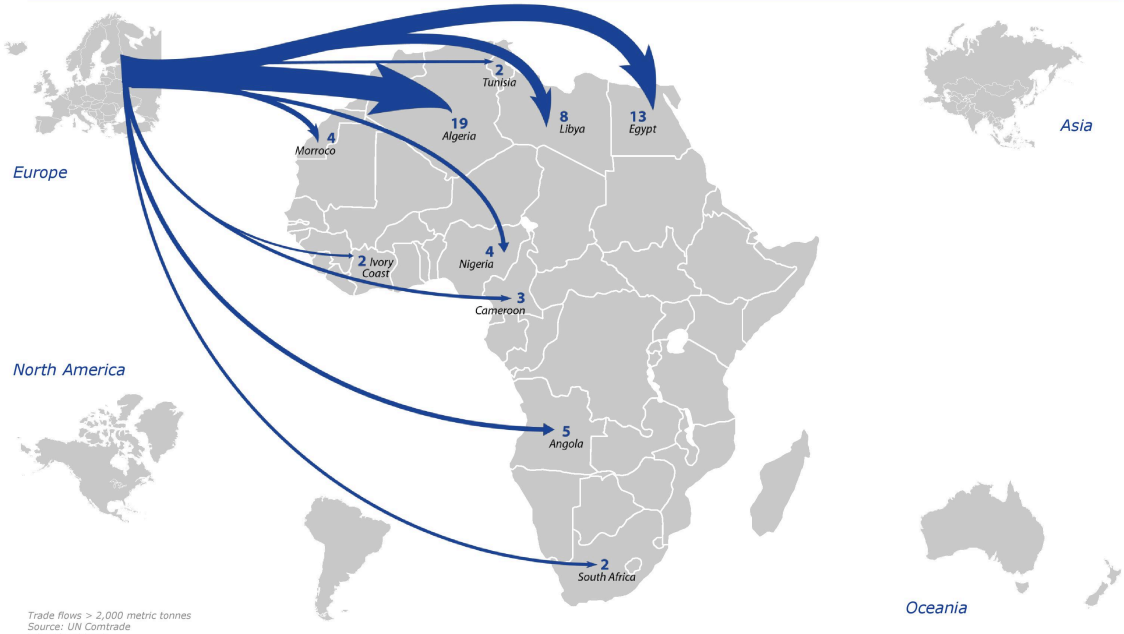
- Egypt
- Morocco
- Algeria
- Nigeria
- Ghana
- Ethiopia
- South Africa
- Namibia
- Libya
- Rest of Africa

Source: UN Comtrade
HS code 0405

50

B.6 Infant formula trade

Dairy trade patterns: Infant formula

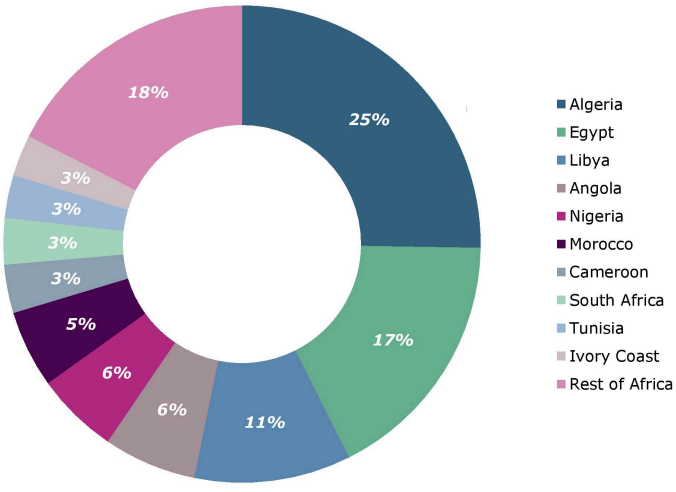


Trade flows > 2,000 metric tonnes
Source: UN Comtrade
HS code 190110
Note: quantities represent infant formula, not necessarily infant milk formula (IMF)

51

Destination: Infant formula

Import market shares infant formula, 2013



Total volume of infant formula imports into Africa

76 779 tonnes

Trade flows > 2,000 metric tonnes
Source: UN Comtrade
HS code 190110
Note: quantities represent infant formula, not necessarily infant milk formula (IMF)

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APPENDIX C – GEOGRAPHICAL PATTERNS AND MARKET ACCESS

This appendix compares observed aggregate dairy trade behaviour with the geographical pattern of tariff profiles, a frequently mentioned (dis)incentives for trade. In addition, dairy trade patterns are reviewed in the light of an important natural barrier to trade: whether a country is coastal or landlocked.

C.1 Role of tariff profiles

COUNTRY	DAIRY IMPORT TARIFF[1]	DAIRY IMPORTS ('000 tonnes MEQ)	POPULATION[2] (millions)	DAIRY IMPORT PER CAPITA (MEQ)
Kenya	60%	94,7	44,35	2,13
Nigeria	20%	1309,5	173,62	7,54
Ivory Coast	20%	169,9	20,32	8,36
Rwanda	60%	3,2	11,78	0,27
Ghana	20%	319,5	25,90	12,34
Senegal	20%	242,8	14,13	17,18
Ethiopia	30%	20,1	94,10	0,21
Tanzania	60%	41,5	49,25	0,85
Mozambique	20%	160,7	25,83	6,22
Uganda	60%	7,7	37,58	0,20

[1] *WTO (2014),* [2] *African Development Bank Group (2013)*

As a general rule, the higher the level of imports tariffs, the lower is the per capita dairy import volume (MEQ). Is trade in Sub-Saharan Africa in conformity with this rule? From the table above it becomes clear that Sub-Saharan African countries with 20% tariffs have dairy imports above 6kg (MEQ) per capita, whereas Sub-Saharan African countries with 60% tariffs generally have imports below 1kg (MEQ) per capita. This pattern resembles the general rule. Kenya, with 60% tariffs but slightly more than 2kg import per capita, shows a slight upward deviation but not direct violation. This deviation may be explained by the fact that GDP per capita as well as dairy consumption estimates (Makoni et al., 2014, FAO, n.d., Land O'Lakes, 2010) are substantially higher in Kenya compared to neighbouring countries. Ethiopian import behaviour, on the other hand, seems to be in violation of patterns observed. The country does not merely enforce a unique import tariff of 30%, but a fairly different public policy towards foreign involvement than other Sub-Saharan African countries. Moreover consumption patterns (cheese, butter) could provide further clarification. After all, the value of butterfat on the global market is comparatively high rendering imports of these products in conflict with the quest for affordability.

C.2 Role of geographical situation

COUNTRY	GEOGRAPHY	DAIRY IMPORTS ('000 tonnes MEQ)	POPULATION[1] (millions)	DAIRY IMPORT PER CAPITA (MEQ)
Kenya	Coastal	94,7	44,35	2,13
Nigeria	Coastal	1309,5	173,62	7,54
Ivory Coast	Coastal	169,9	20,32	8,36
Rwanda	Landlocked	3,2	11,78	0,27
Ghana	Coastal	319,5	25,90	12,34
Senegal	Coastal	242,8	14,13	17,18
Ethiopia	Landlocked	20,1	94,10	0,21
Tanzania	Coastal	41,5	49,25	0,85
Mozambique	Coastal	160,7	25,83	6,22
Uganda	Landlocked	7,7	37,58	0,20

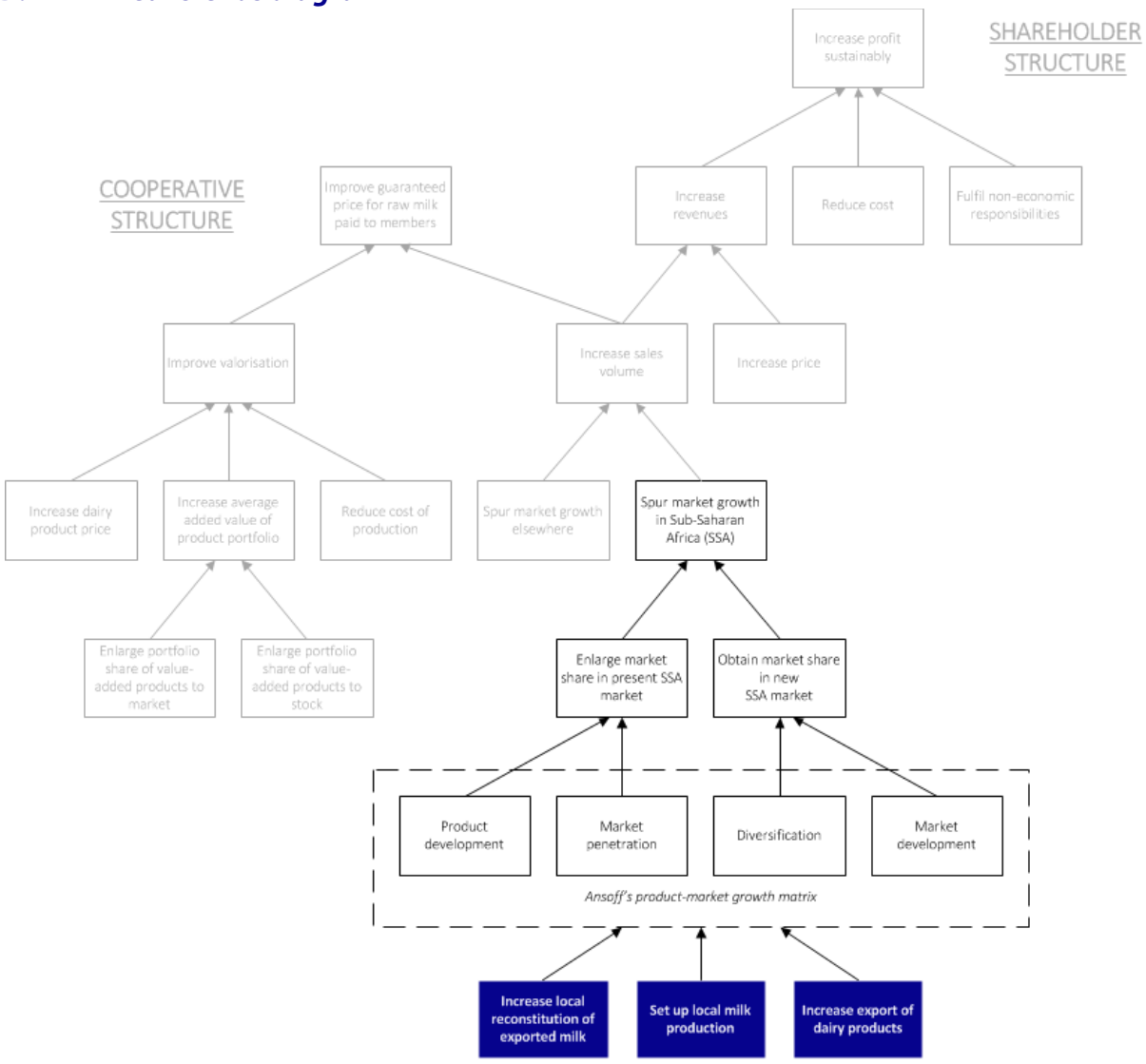
[1] *African Development Bank Group (2013)*

As a general rule, one would expect the trade levels – c.q. per capita dairy import volume (MEQ) – to be higher for coastal than landlocked countries. Is trade in Sub-Saharan Africa in conformity with this rule? The table above shows very clear conformity with the rule. Dairy imports are as low as 0,20-0,27 for the landlocked countries under consideration as opposed to 0,85-17,18 for their coastal neighbours.

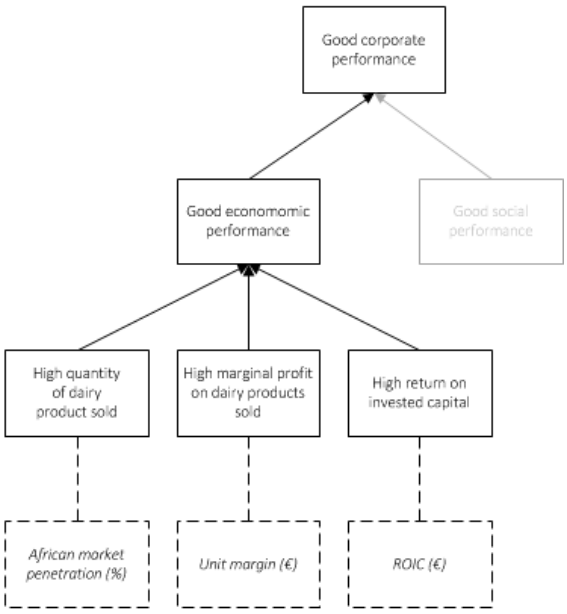
APPENDIX D– SYSTEMS ANALYSIS

This appendix provides insight into the exploratory systems analysis (see paragraph 2.2.3.3) executed to achieve better understanding of complex dynamics described in chapter 4. Diagrams D.1 and D.2 feed into the construction of a systems diagram, which in presented in D.3.

D.1 Means-ends diagram

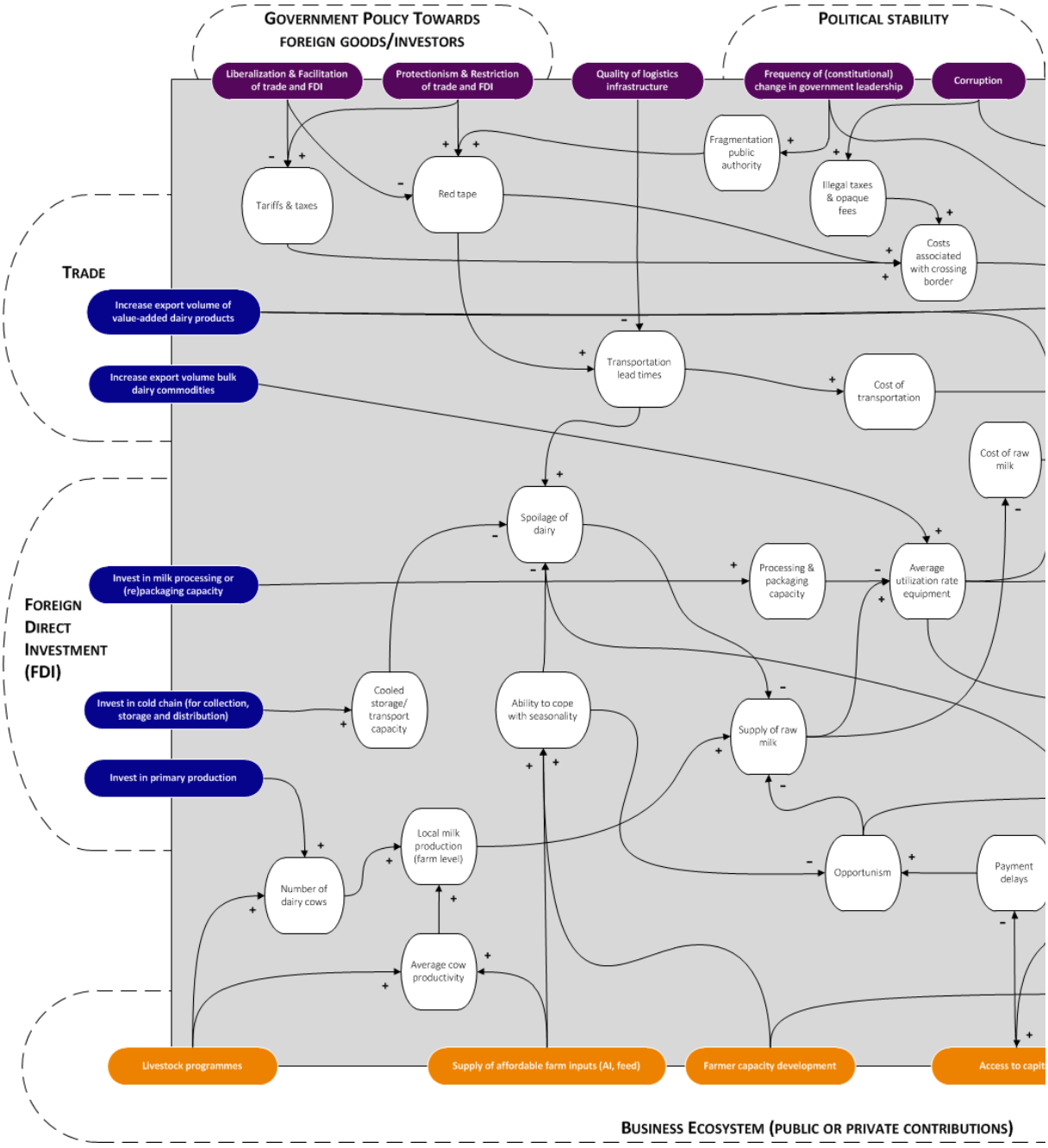


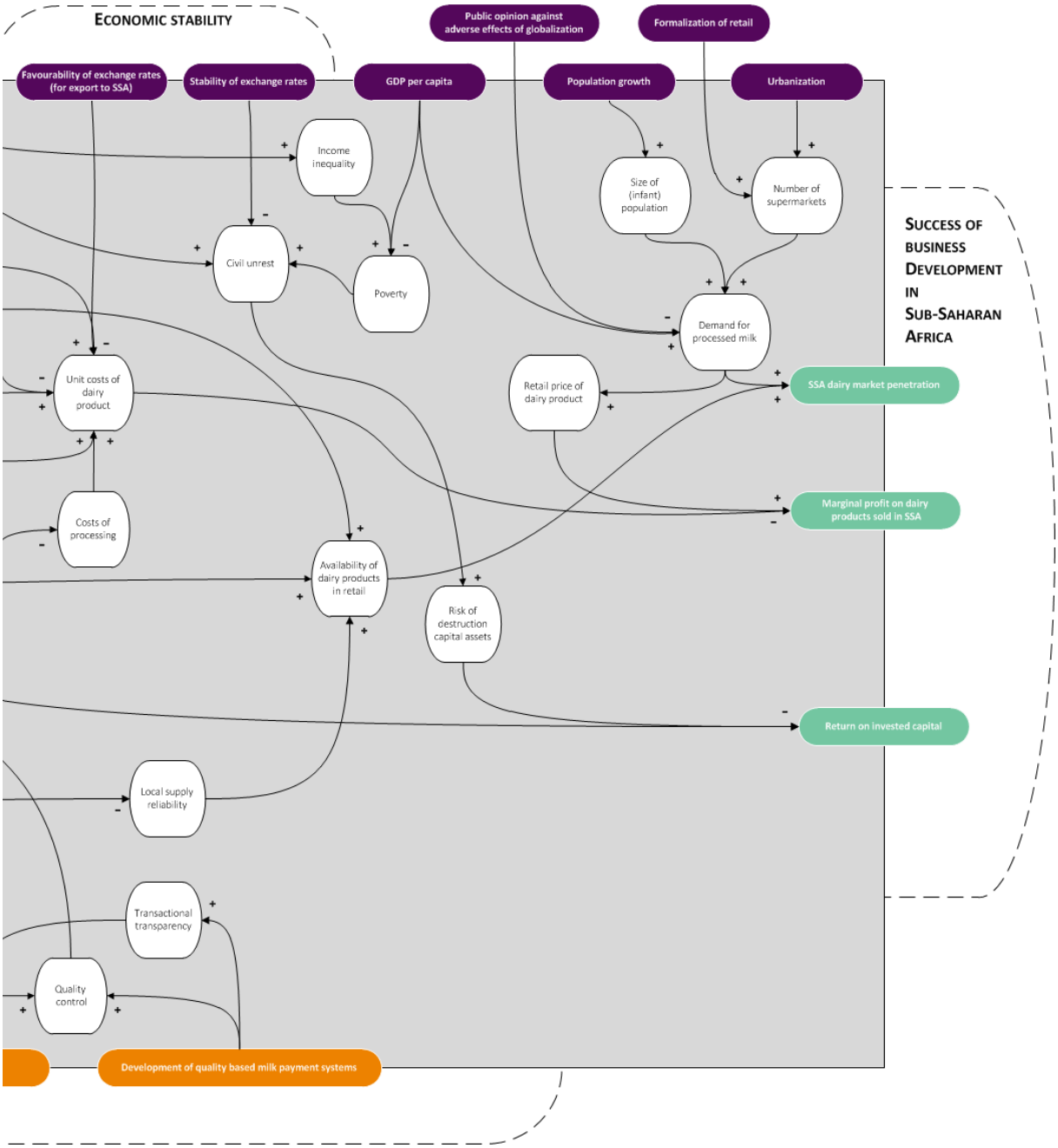
D.2 Objectives tree



D.3 Systems diagram

The systems diagram presented hereafter is the conceptual model of the former 'black box' of African dairy. It should be read as follows. The desired situation is generally described in terms of *objectives*, of which the realization is measured through the use of *criteria*, which can be found on the right side of the diagram. These criteria follow from the objectives tree presented in D.2. In other words, criteria are linked to the primary interest of the corporate decision-maker, i.e. economic performance. Available options for business development (see paragraph 1.4) constitute the *means* on the left side of the diagram. Finally there are some *external factors* found on top of the diagram beyond control of the decision-maker that however do place important limitations of constraints on the behaviour and outcome of the system. The influence over factors placed on the bottom of the diagram is ambiguous. These are generally public-private initiatives. This implies that they constitute a means to the corporate decision-maker while contribution of the public authority may be considered beyond influence. Arrows indicate causal relationships, which indicate positive correlation if labelled with a '+' but negative correlation if labelled with a '-'.


GOVERNMENT POLICY TOWARDS FOREIGN GOODS/INVESTORS
POLITICAL STABILITY
Liberalization & Facilitation of trade and FDI
Protectionism & Restriction of trade and FDI
Quality of logistics infrastructure
Frequency of (constitutional) change in government leadership
Corruption
Fragmentation public authority
Tariffs & taxes
Red tape
Illegal taxes & opaque fees
Costs associated with crossing border
TRADE
Increase export volume of value-added dairy products
Increase export volume bulk dairy commodities
Transportation lead times
Cost of transportation
Cost of raw milk
Spoilage of dairy
Invest in milk processing or (re)packaging capacity
Processing & packaging capacity
Average utilization rate equipment
FOREIGN DIRECT INVESTMENT (FDI)
Invest in cold chain (for collection, storage and distribution)
Cooled storage/ transport capacity
Ability to cope with seasonality
Supply of raw milk
Invest in primary production
Local milk production (farm level)
Number of dairy cows
Opportunism
Payment delays
Average cow productivity
Livestock programmes
Supply of affordable farm inputs (AI, feed)
Farmer capacity development
Access to capit
BUSINESS ECOSYSTEM (PUBLIC OR PRIVATE CONTRIBUTIONS)


ECONOMIC STABILITY
Public opinion against adverse effects of globalization
Formalization of retail
Favourability of exchange rates (for export to SSA)
Stability of exchange rates
GDP per capita
Population growth
Urbanization
Income inequality
Size of (infant) population
Number of supermarkets
Civil unrest
Poverty
Demand for processed milk
SUCCESS OF BUSINESS DEVELOPMENT IN SUB-SAHARAN AFRICA
Unit costs of dairy product
Retail price of dairy product
SSA dairy market penetration
Costs of processing
Marginal profit on dairy products sold in SSA
Availability of dairy products in retail
Risk of destruction capital assets
Return on invested capital
Local supply reliability
Transactional transparency
Quality control
Development of quality based milk payment systems

APPENDIX E – ACTOR ANALYSIS

This appendix provides and overview of the analytical steps that allowed for building better understanding of the multi-actor aspects of the complex dynamics described in chapter 4.

E.1 Systematic comparison of actor interests, objectives and perceptions

ACTOR	INTERESTS	DESIRED SITUATION & OBJECTIVES	CURRENT/EXPECTED SITUATION & GAP	CAUSES	SOLUTIONS
African dairy consumer	Health Satisfaction	Affordability Convenience Tasty dairy products Wide availability	Price unpredictability Empty shelves Quality not guaranteed	Irregular supply	Cheap high-quality imports
African governments	Economic development Welfare of citizens	Self-sufficiency Food safety/quality Food security	Dairy deficit Lack of quality control Loss of public revenue Poverty	Limited domestic milk production Large informal market Commodity price volatility	Attracting private capital Progress towards formalization Export diversification Import substitution
African dairy farmers (individual or cooperative)	Milk production	Good, stable income	Low, fluctuating yields Lack of access to finance	Seasonality of production Low cow productivity Creditworthiness Inefficiency and power of processors	Affordable farm inputs Scale efficiency Cash flow finance or supplier finance
African small-scale traders	Unconnected supply and demand	Good, stable income Limited contract farming	Price unpredictability Irregular supply	Seasonality of production Market distorted by cheap imports	Cold storage No progress towards formalization
African trade agents/distributors (licensed)	Economic profit Business continuity	Good, stable income Trust, customer satisfaction	Varying margins Irregular supply Insatiable demand	Corruption Red tape Commodity price volatility Spoilage High costs of inland distribution	Good B2G relationship Infrastructural improvements Hedging instruments Warehousing facilities
African dairy processing companies	Economic profit Business continuity	Substantial market share Reasonable margin Manageable financial and reputational risks	Threat of many new entrants Market distorted by cheap imports Products of foreign origin preferred Irregular supply	Low domestic production Seasonality Corruption Spoilage Poor quality control Lack of goodwill among consumers	Cold chain Better policy enforcement Protectionism Access to capital for investment
African bank	Economic profit Business continuity	Substantial market share Reasonable margin Manageable financial and risks	Limited amount of bankable clients Lack of insight in risks	Creditworthiness SMEs Poor documentation and financial administration Lack of understanding in dairy sector	Risk-based supervision Diversification of portfolio Knowledge partners

Rabobank	Economic profit Business continuity	Substantial market share Reasonable margin Manageable financial and risks	Expensive financial services Large, unknown risks Prohibition to provide financial services (sometimes)	Creditworthiness SMEs Poor documentation and financial administration Protectionism against FDI	Financial innovation Progress formalization More financial services to existing corporate clients Partner banks
International dairy companies	Economic profitability Business continuity	Substantial market share Reasonable margin Manageable financial and reputational risks	No or minor market share Lack of quality control Capital investment risk	No cold chain Corruption Political instability	Shift operations to non-resource rich countries Imports processed products Build B2G relationships
International dairy commodity traders	Economic profit Business continuity	Reasonable margin Predictable time/costs	Opaque trade costs High import tariffs Administrative burden High costs of transportation Long transport lead times Frequent delays (spoilage) at the border	Corruption Red tape Commodity price volatility	Trade facilitation Good business-to-government relationships Tariff exemption
Retailer	Economic profit Business continuity	Rapid expansion Availability Supply reliability Quality control Product affordability	Slow expansion Empty shelves Irregular supply Lack of quality control Uncompetitive price	Lengthy chains Red tape Limited cold chain facilities High costs of transportation	Contracts Formalization Cheap imports
Shipping companies	Economic profit Business continuity	Reasonable margin Predictable time/costs Unsatisfactory port infrastructure	High margin pressure Administrative burden Unexpected costs Frequent delays at African ports	Corruption Red tape Overcapacity shipping industry Low level of infrastructural investment	Strategic pricing Good business-to-government relationships Trade facilitation Re-routing Setting up own terminals "Slow steaming"
Farm input providers	Economic profit Business continuity	Increase sales in Sub-Saharan Africa Predictable demand for bulk Tailored products Manageable financial and reputational risks	Limited sales (too little for upfront R&D investment) Unpredictability of demand High costs of transportation Basic facilities (e.g. feed mills) lacking	Farmer's lack of access to capital Insecurity of warehousing Commodity price volatility No access to water, liquid nitrogen etc. Climate	Risk coverage Increased investment in transport infrastructure, energy grid, etc. B2G relationships
Dairy knowledge institutions	Sector development	Knowledge transfer Farmer capacity building	Fragmentation of sector hampering knowledge Only small-scale initiatives	Limited resources (capital, manpower) Limited impact	Business ecosystem
Non-African governments (of net dairy exporting countries)	Economic growth and stability Sustainable international relationships	Business continuity of national champions, i.e. easy access to Sub-Saharan Africa markets	FDI and trade in Sub-Saharan Africa markets hampered Lot of money going to development aid	No self-sufficiency Political instability Supply shocks	Bilateral trade agreements
Development agencies	Economic development Welfare of African citizens	Food security Higher income African population	Unstable income, majority Africa living on less than $2 per day	Commodity price volatility Market distorted by cheap imports	Capital for investing in local production

				Low dairy farm productivity	systems Cow breeding
World Trade Organization	Free trade	Tariff liberalization Trade facilitation	Excessive trade costs Sub-Saharan Africa Limited participation of Sub-Saharan Africa in world trade	Red tape Corruption Dependency on revenue from customs duties	Bigger inflow FDI into Sub-Saharan Africa
UN institutions	Economic development Welfare of (African) citizens	Food security Mitigating climate change Less livestock consumption globally)	Excessive trade costs No dairy self-sufficiency Poverty	Red tape Corruption Political instability Climate	Infrastructural improvement Trade facilitation Capital
Sustainable trade interest groups	Sustainability (economic, ecologic)	Fair prices No unnecessary transportation	High prices paid by African consumer Unbalanced global production	Excessive costs Oligopolistic market	Trade facilitation Competition policy

E.2 Resource dependency and criticalities

ACTOR	RESOURCES	REPLACEABLE?	DEPENDENCY	CRITICAL?
African dairy consumer	Spending power	No	High	Yes
African government	Authority in determining tariff profiles and quality standards Public capital	Yes/no	High	Yes
African dairy farmers (individual or cooperative)	Land Cows	Yes	Limited	No (depends on scale)
African small-scale traders	Flexibility Access to farmers	Yes	Limited	No
African trade agents/distributors (licensed)	Strategic position in business network (B2B, B2G)	No	High	Yes
African dairy processing company	Market share Processing capacity / MCCs Local knowledge	Yes	Limited	No
African bank	Some private capital	Yes	Limited	No
Rabobank	Much private capital Knowledge of dairy sector Tailored/innovative financial services	Yes	Medium	Yes
International dairy companies	Knowledge/skills of dairy sector Some private capital Creditworthiness	-	-	-
International dairy commodity traders	B2G relationships Local agents Creditworthiness	-	-	-
Retailer	Channels to market Creditworthiness	Yes	High	Yes
Shipping companies	Geographical access to markets B2G relationships	No	High	Yes
Farm input providers	Critical inputs to dairy farming	No	High	Yes
Dairy knowledge institutions	Knowledge of dairy sector	Yes	Medium	No
Non-African governments (net dairy exporting countries)	Authority Multilateral public partnerships	No	Medium	Yes
Development agencies	Goodwill/trust Support from African governments Money (development aid) Organization and experience on the ground	No	Limited	No
World Trade Organization	Authority/formal power Legitimization Information	No	Limited	No
UN institutions	Authority/formal power	No	Medium	No
Sustainable trade interest groups	Support from rank-and-file	Yes	Limited	No

E.3 Assessment of dedication and classification for actor interdependencies

The tables below provide an overview on the different types of actors on whom the international dairy company or commodity trader depends to a larger or lesser degree. The former table presents the typology, while the second table has been filled with actor involved in African dairy. The dashed line indicates that whether these dedicated parties are supporting or conflicting the undertakings depends on how business is being developed. Support might be lost if the dairy companies or traders merely maximize their own profit without taking up any further social responsibilities.

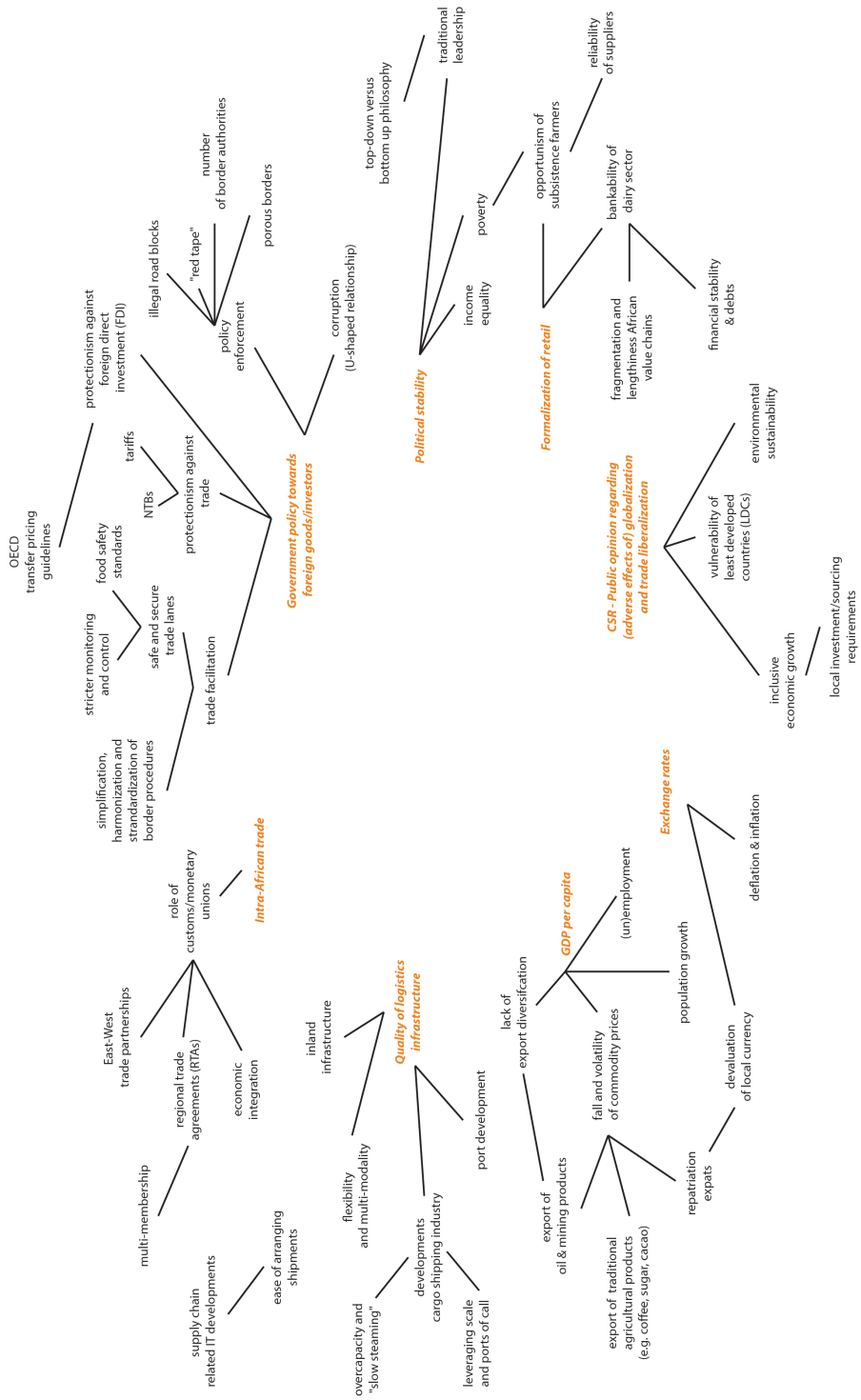
	DEDICATED		NON-DEDICATED	
	CRITICAL	NON-CRITICAL	CRITICAL	NON-CRITICAL
SUPPORTIVE	Potentially strong allies	Potentially weak allies	Indispensable allies but hard to activate	No need to be involved initially
CONFLICTING	Biting dogs	Barking dogs	Sleeping dogs	Stray dogs

	DEDICATED		NON-DEDICATED	
	CRITICAL	NON-CRITICAL	CRITICAL	NON-CRITICAL
SUPPORTIVE	African dairy consumer African commercial dairy farmers Rabobank African trade agents/distributors Rabobank Non-African governments	Dairy knowledge institutions Development agencies UN institutions	Retailer Shipping companies Farm input providers	African banks
CONFLICTING	African government	African smallholder dairy farmers African small-scale traders African dairy processing companies Sustainable trade interest groups		World Trade Organization

APPENDIX F – RANKING DRIVING FORCES

This appendix serves as illustration of and elaboration on scenario steps as described in paragraph 2.3: how trends mentioned during the interviews have been systematically reduced to a number of driving forces subject to ranking (F.1), the request for ranking sent out to participants (F.2), and how scenario drivers follow from the ranking procedure (F.3).

F.1 Grouping of macro-environmental factors into driving forces



F.2 Ranking request sent out

[…]

To wrap up, I would like to request your expertise for evaluating some driving forces of African dairy sector development in terms of impact and uncertainty. *Filling out the table below* should take no more than a couple of minutes, but at the same time expert intuition will form the backbone of the scenario planning I am currently undertaking. Taken together, these judgments allow for arriving not merely upon the most plausible African dairy future while hoping for it to pass along, but for arriving at broader understanding of possible futures.

I have grouped the variety of uncertain aspects beyond influence, as mentioned during a series of interviews/calls, into eight so-called driving forces.

Could you please fill out the table below by reviewing the driving forces separately in terms of their strategic *impact* and their *uncertainty*? Please note that this second dimension is not about the uncertainty as to the type/size of impact it might have, but about the uncertainty rooted in the driving force itself.

For both impact and uncertainty, it would be very much appreciated if you could provide your evaluation in two ways:

- Ranking (1st, 2nd, …8th) – number 1 corresponds to *biggest* impact or *most* uncertain, while number 8 corresponds to *smallest* impact or *least* uncertain
    - Please note that this concerns a categorization in relative terms. In other words, each rank should be assigned exactly (but no more than) once.
- Categorizing each driving force by their impact and uncertainty (high, medium or low)
    - Please note that this concerns a categorization in absolute, *not* in relative, terms. In other words, labelling all eight driving forces as "highly uncertain" is allowed too.

	Impact		**Uncertainty**	
	Ranking (1=most, 8=least)	High, medium or low	Ranking (1=most, 8=least)	High, medium or low
Government policy[1] towards foreign goods/investors[2]				
Quality of logistics infrastructure[3]				
Intra-African trade[4]				
GDP per capita[5]				
Exchange rates[6]				
Political stability[7]				
CSR – Public opinion regarding (adverse effects[8] of) globalization and trade liberalization				
Formalization of retail[9]				

[1] Any protective/facilitating measure by African governments aimed at trade or foreign investment as well as (in)adequate enforcement thereof

[2] Affects complexity of cross-border movements, thereby cost and unpredictability of transaction

[3] For both international shipping and inland logistics, refers to transportation infrastructure, plus ICT insofar related to supply chain

[4] Both within regional unions as well as across the African continent

[5] Gross Domestic Product is a common measure for economic performance; GDP per capita can be interpreted as an indicator of consumer purchasing power

[6] Both volatility and favourability for imports into Africa

[7] Corruption falls under this heading

[8] Such as those related to environmental sustainability and vulnerability of least developed countries

[9] Transition from fragmented, informal market to structured, modernized retail market

[…]

F.3 Outcome

The tables below contain the ranking in relative terms as received from the group of participants described above. Notwithstanding the request to assign each rank exactly (but no more than) once, some participants assigned to two driving forces a shared rank. The apparent inability to ranking the one higher or lower than the other has been respected and these rankings (e.g. 7/8 assigned twice) have been translated into average rankings (e.g. rank 7,5 assigned twice). In the tables below, the number 1 corresponds to *biggest* impact or *most* uncertain, while number 8 corresponds to *smallest* impact or *least* uncertain. In brief, the highlighted cells indicate the lowest numbers, that is, the driving forces that have been turned into the scenario axes.

DRIVING FORCES	
A	Government policy towards foreign goods/investors
B	Quality of logistics infrastructure
C	Intra-African trade
D	GDP per capita
E	Exchange rates
F	Political stability
G	CSR – Public opinion regarding (adverse effects of) globalization and trade liberalization
H	Formalization of retail

	RANKING BY IMPORTANCE							
	A	B	C	D	E	F	G	H
1	1	3	4	5	6	2	7	8
2	3	2	4	5	6	1	7	8
3	2	8	4	6	7	1	5	3
4	4	2	6	1	7	3	8	5
5	3	1	7	2	8	4	5	6
6	1	3	4	5	6	2	7	8
7	2	1	5	6	4	3	7	8
8	4,5	1	7	4,5	4,5	2	8	4,5
9	3	3	6,5	3	6,5	3	8	3
10	2,5	2,5	5,5	8	2,5	2,5	7	5,5
	26	**26,5**	**53**	**45,5**	**57,5**	**23,5**	**69**	**59**

	RANKING BY UNCERTAINTY							
	A	B	C	D	E	F	G	H
1	4	7	3	5	6	1	8	2
2	4	7	4	7	4	1,5	1,5	7
3	1	7	4	8	5	2	6	3
4	4,5	6	2	4,5	1	3	7	8
5	1	6	7	4	5	2	3	8
6	4	7	3	5	6	1	8	2
7	2	3	5	6	1	4	7	8
8	6	2,5	8	2,5	6	1	4	6
9	3	3	6,5	3	6,5	3	8	3
10	2	4	7	4	1	7	7	4
	31,5	**52,5**	**49,5**	**49**	**41,5**	**25,5**	**59,5**	**51**

COMBINED RANKING BY IMPORTANCE AND UNCERTAINTY							
A	B	C	D	E	F	G	H
8	**14**	26	23	24	**6**	41	30

APPENDIX G – MULTI CRITERIA ASSESSMENT

The country-by-country strategy guide for business development, as presented in paragraph 6.2, follows from assessment of all ten countries under consideration in the light of six criteria.

- *Logistics connectivity*, based on
  - Whether the country is landlocked or coastal, given that as a general rule landlocked countries import far less dairy per capita than their coastal ones (see appendix C)
  - Ease of arranging international shipments, for which a country-level subranking of the Logistics Performance Index (LPI) (Arvis et al. 2014) is available
- *Import tariffs* – after all, as a general rule, the lower import tariffs, the higher is per capita dairy import (see appendix C) – for which values have been assigned on the basis of the MFN applied tariff profile for dairy products (WTO, 2014)
- *Ease of crossing borders*, based on:
  - Efficiency of border procedures and goods clearance, for which a country-level subranking of the LPI (Arvis et al. 2014) is available
  - Corruption Index (World Bank)
- *Climate*, in particular the presence of sub-humid or semi-arid zones and highlands; values have been assigned on the basis of country profiles in reports by Wageningen UR Livestock Research (van der Lee et al., 2013; Makoni et al., 2014)
- *Cold chain and processing capacity*; values have been assigned on the basis of country profiles in reports by Wageningen UR Livestock Research (van der Lee et al., 2013; Makoni et al., 2014)
- *Cost price (farm gate level)*, based on estimates drawn up by Wageningen UR Livestock Research (Makoni et al., 2014), and estimates by Hemme et al. (2014), for the purpose of triangulation and insofar necessary to fill gaps in data, global price levels

The average of the values assigned to the criteria corresponds to the direction of the arrow in the strategy guide (see figure 16). The arrows, particularly the direction relative to that of arrows associated with other countries, have been submitted for review by a number of Dutch Embassies in the Sub-Saharan African region.

		SUCCESS OF TRADE			SUCCESS OF LOCAL PRODUCTION			
REGION	COUNTRY	*Logistics connectivity*	*Import tariffs*	*Ease of crossing borders*	*Climate*	*Cold chain/ processing capacity*	*Cost price*	*Average value*
West Africa	*Ghana*	-1	-1	-1	-1	-1	-1	**-1,00**
	Ivory Coast	-2	-2	0	-1	-1,5	-1	**-1,25**
	Nigeria	0	-2	1	0	2	0	**0,17**
	Senegal	-2	-2	-2	-2	-2	-1	**-1,83**
East Africa	*Ethiopia*	1	1	-1	2	0	0	**0,50**
	Kenya	-2	2	2	2	2	1	**1,17**
	Mozambique	2	0	1	1	-1	1	**0,67**
	Rwanda	1	2	-2	1	2	2	**1,00**
	Tanzania	2	2	1	1	1	2	**1,50**
	Uganda	1	2	0	2	1	2	**1,33**

VALUES ASSIGNED	
-2	Speaking strongly in favour of trade
-1	Speaking in favour of trade
0	
1	Speaking in favour of setting up local production
2	Speaking strongly in favour of setting up local production

APPENDIX H – LISTS OF INTERVIEWS CONDUCTED

DATE	LOCATION	NAME	ORGANIZATION	EXPERTISE
Several	Utrecht	Sierk Plaat	Rabobank International, Food & Agribusiness Research	Africa
Several	Utrecht/London	Matthew Johnson Kevin Bellamy *Confidential*	Rabobank International, Food & Agribusiness Research	Dairy industry, focus Europe
Several	New York	*Confidential*	Rabobank International, Food & Agribusiness Research	Dairy industry, focus US
12 February	Netherlands	*Confidential*	Royal Tropical Institute	Africa
24 February	Netherlands	Jan van der Lee	Wageningen University (WUR)	Livestock farming (in Africa)
25 February	Utrecht	*Confidential*	Rabobank International, Rabo Foundation, Rural Fund	Farmer cooperatives and small and medium-sized enterprises (SMEs) in developing countries
27 February	Netherlands	Lars Kramer	Netherlands-African Business Council (NABC)	Recent activities and information need of Dutch dairy companies operating in Africa
9 March	United Kingdom (call)	*Confidential*	*Confidential (external client)*	Local breeds in Sub-Saharan Africa and increasing their productivity AI service delivery
10 March	Utrecht	*Confidential*	Rabobank International, Rabo Development	Financial support to (dairy) sector in developing countries
26 February, 12 March	Utrecht	*Confidential*	Rabobank International, Export Finance	Credit solutions for exporters for capital investments, mainly in processing equipment and cold chain
18 March	Utrecht	*Confidential*	Rabobank International, Multilateral Development Banking	Bankability F&A sector Sub-Saharan Africa
20 March	Utrecht	*Confidential*	Rabobank International, Trade and Commodity Finance	Kenyan dairy landscape/players Strategic undertakings by large dairy traders
26 March	Mozambique (call)	*Confidential*	*Confidential (external client)*	Mozambique, mainly socio-economic and political
26 March	Rwanda (call)	*Confidential*	*Confidential (external client)*	Dairy development in Rwanda
27 March	Mozambique (call)	*Confidential*	*Confidential (external client)*	Dairy development in Mozambique
27 March	Uganda (call)	*Confidential*	*Confidential (external client)*	Dairy sector development in Uganda and Kenya
8 April	Netherlands	Fred van Ipenburg	Dutch Tax Administration, Customs Office	Trade facilitation
10 April	Netherlands	Godfried Smit *Confidential*	EVO *Confidential (external client)*	Trade facilitation
20 April	Netherlands	*Confidential*	ESADA	Sector development and role of farmer cooperatives, role of South Africa in dairy trade
28 April	Netherlands	*Confidential*	*Confidential (external client)*	Dairy trade with Sub-Saharan Africa
30 April	Netherlands	*Confidential*	*Confidential (external client)*	Dairy business development in Sub-Saharan Africa, focus West
4 May	Belgium (call)	*Confidential*	*Confidential (external client)*	Uncertainties faced by stakeholders in European dairy industry
6 May	Switzerland (call)	*Confidential*	*Confidential (external client)*	Dairy commodity trade with Sub-Saharan Africa

12 May	Kenya (call)	*Confidential*	*Confidential (external client)*	Dairy business development in Sub-Saharan Africa, focus East
	Ethiopia (call)	Hans van den Heuvel Jan Willem Nibbering	Embassy of the Netherlands in Addis Ababa	Business environment and agricultural sector of Ethiopia
	Mozambique (call)	Ton Negenman	Embassy of the Netherlands in Maputo	Business environment and agricultural sector of Mozambique
	Ghana (call)	Thierry van Helden	Embassy of the Netherlands in Accra	Business environment and agricultural sector of Ghana and Ivory Coast
	Nigeria (call)	Taco Westerhuis	Embassy of the Netherlands in Lagos	Business environment and agricultural sector of Nigeria