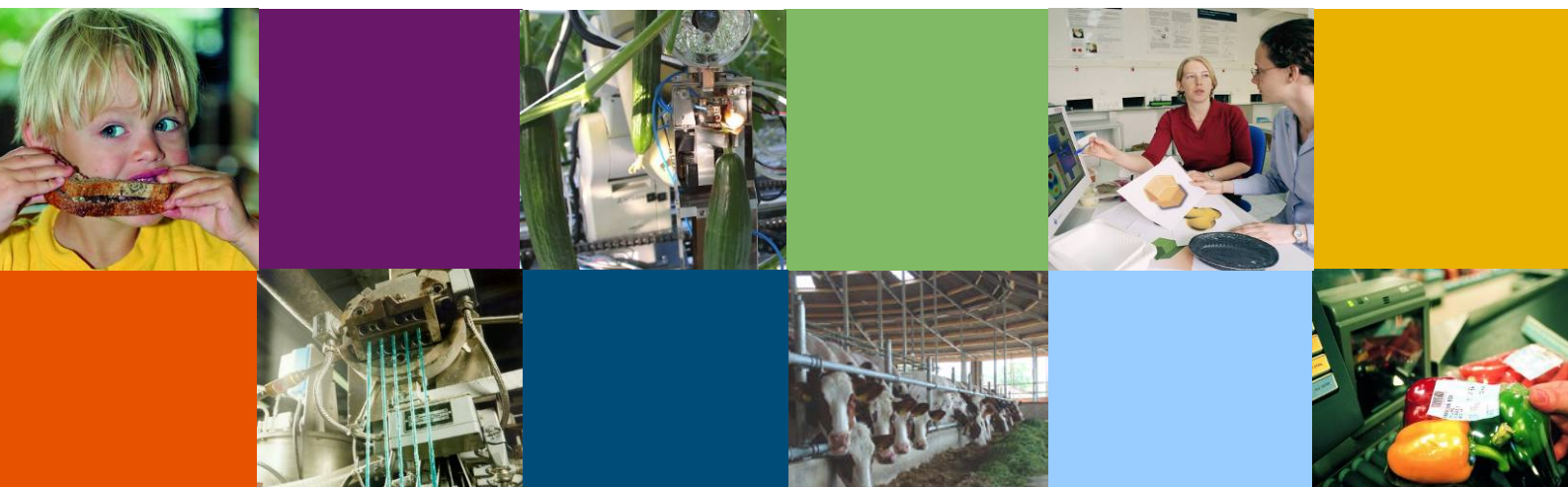


Metropolitan food supply: Case Study Cairo

A quick scan study to enhance fresh food supply and minimize post-harvest losses.

Willie van den Broek
Henry Boerrigter

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Wageningen UR Food & Biobased Research
P.O. Box 17
NL-6700 AA Wageningen
Tel: +31 (0)317 480 084
E-mail: info.fbr@wur.nl
Internet: www.wur.nl

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Abstract

To investigate options for “Metropolitan food production systems” in Egypt and specifically in the Cairo region, a ‘cold chain quick scan’ is conducted by Wageningen UR post-harvest specialists. The study comprehends a quick scan for market demand, market willingness and a search for trend development affecting metropolitan agriculture. Candidate chain concepts are proposed and discussed.

The report is an overview of options for Cairo food supply chain improvements. The recommendations for improvement are based on interviews with representatives of different actors in the supply chain and on interpretation by the interviewers.

For every link in the distribution chain of fresh products a description is given of the present status, the key issues and possible directions or solutions that were mentioned by the different interviewees.

Proposals for further actions that strengthen the food supply chain are summarized and put in a schematic view.

The scheme is:

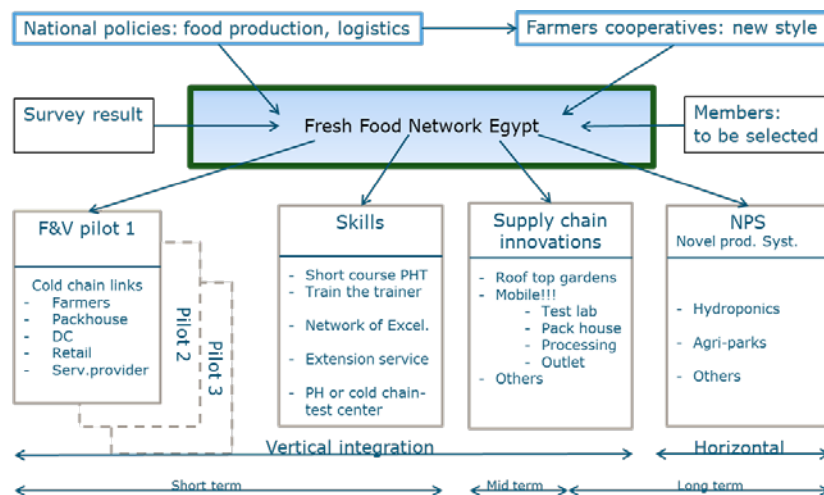


Figure: Output of a quick scan inventory aiming for food supply chain improvements in Cairo

A **commitment activity** to organise hands on activities is seen as the most logical next step.

The top 3 of follow up ideas therefore is:

1. What is the feasibility of a hydroponic lettuce production pilot in the Sharm-el-Sheikh area.
2. With whom, how and when launching of PH-short courses and NoE in Egypt.
3. Prepare for a first fresh food network stakeholder meeting.

Content

Abstract	3
1 Introduction	5
2 Methods	6
3 Supply chain description & Interpretation	8
3.1 Production	8
3.2 Collection center	11
3.3 Transport & distribution	11
3.4 Wholesale centres near Cairo	12
3.5 Retailing in Cairo	12
3.6 Consumers	14
3.7 Metropolitan food systems	14
4 Supply chain improvements	17
4.1 Proposed initiatives	17
4.2 Schematic overview of follow up options	20
5 Recommendations	21
6 Acknowledgements	22
Appendix I	23
Appendix II	26

1 Introduction

To investigate options for “Metropolitan food production systems” in Egypt and specifically in the Cairo region, a quick scan of the local cold chain is conducted by Wageningen UR post-harvest specialists. The study comprehends a quick scan for market demand (market flows & market retail penetration), market willingness (discussions with existing stakeholders), and a search for trend development affecting metropolitan agriculture to discuss candidate chain concepts. For the most appreciated chain concepts, follow-up ideas are posted in this report.

The quick scan was carried out in November 2013. This report covers the findings and insights as gained during that mission. The study was initiated and supported by the Dutch agricultural counselor in Cairo and by the Ministry of Economic Affairs, as a part of the agro-logistic program for Egypt.

DGAGRO of the Ministry of Economic Affairs is developing a program on agro-logistics in Egypt and the agenda of the program is setup in close cooperation with the agricultural office of The Netherlands embassy. Starting point of the program is that the linkage between agri-food and logistics is very important with respect to building efficient agri-chains. The use of efficient agri-chain concepts is a mayor contribution to the success of The Netherlands as, besides the United States, the world’s biggest agri-food exporter.

An agri-logistics forum offers a platform for exchanging good practices, identifying cooperation potential (among Egyptian parties and Dutch companies/technologies included), identifying and solving bottlenecks to develop flexible and adaptive supply chains for the local situation. Besides the forum, an accompanying agro-logistic innovation program contains plans on improvements in food supply to local agri-food markets and urban distribution. The focus is mainly on food distribution at affordable prices and doing this in a sustainable way i.e. limit its impact on urban mobility and minimize food waste in the supply chain.

2 Methods

The quick scan team (respectively a supply chain management specialist and a post-harvest technologist from Wageningen UR Food & Biobased Research (FBR)) interviewed various representatives of different actors, stakeholders, opinion makers and other parties (investors) in the context of making Cairo food supply chains more efficient. The interviewees were selected by the Dutch agricultural council. A list of names of the interviewees and company names is given in appendix 1. Note that actual political developments in Egypt in November 2013 made it impossible or invaluable to speak with governmental policymakers.

For the sake of readability of the report, the authors have chosen a format where the gathered information is summarised for every individual link of the food supply chain. This avoids an enumeration of all interviews, quotes and statements from people with very different backgrounds. Personal or commercial interests of the interviewees may also cause some bias on the facts and opinions of the Cairo food chain.

For every link in the distribution chain of fresh products a description is given of the present status, the key issues and possible directions or solutions that were mentioned by the different interviewees. Focus was: fresh fruit and vegetable production, collection and distribution and where relevant other perishables are included.

The agri-logistic systems of existing food supply chains in Egypt are outlined for every chain link, covering the whole chain from production to consumption. However general market data (e.g. on commodities, origins, numbers, volumes, transport modalities, packaging, post-harvest losses etc. for fresh products for inland trade corridors are apparently not available: local researchers stated that there are no or only a few, but always indicative studies, using estimated numbers on local or regional food supply. The same counts for data on post-harvest losses in Egypt: there are no verified reliable data available.

This lack of data concerning the food chain may be explained by: weak governmental bodies covering these issues (i), the fact that the Cairo food market is to a great extent an informal market (ii), there is no existing strong post-harvest research or knowledge group at ARC or at Egyptian universities (iii) or PHL is only recently seen as an important option to tackle food security (iv).

This all means that no actual, reliable and verified data on the local Egyptian food chains are available. However for effective interventions in improving food supply chains and for future (agri-logistic) plans this is a prerequisite and the data need to be collected.

An elaborated report from Wageningen UR is describing the greenhouse vegetable chain in Egypt in detail: Wijnands, 2004: The impact on the Netherlands of the Egyptian greenhouse vegetable chain, LEI report 5.04.10. The report gives a good overview of the Egyptian situation for horticultural crops grown in greenhouses and offers valuable background information because of the elaborated overview of all stakeholders in this domain. The report can be found at: <http://www.wageningenur.nl/nl/Publicatie-details.htm?publicationId=publication-way-333337383831>

An interpretation of the opinions and statements derived from this quick scan is made and follows roughly 2 lines of thinking, both with their own time line:

1. How to improve current fresh food supply chains (vertical chain integration)
2. Are there promising production systems that adapt to possible food security issues in the future (horizontal chain integration).

Based on the interviews, the expertise of the interviewers and the feedback given at a mid-week workshop (at the Dutch Embassy), a systematic chain development framework positioning various follow up steps i.e. further activities was regarded as a good basis to proceed with actions that improves agro-logistic and fresh food supply chain for the Cairo region.

This framework can be regarded as the output of the mission. Other outputs are: intentions and commitments of various interviewees to collaborate in fresh chain developments in future, when incentives to do so can be found. It is a starting point for future partnerships that are able to initiate new solutions for fresh food supply chains.

3 Supply chain description & Interpretation

3.1 Production

The climate in Egypt is in general very good for the production of a wide range of horticultural products. However, there is a big shortage of water expected since 98% of the surface water is supplied by the Nile river and coming from outside Egypt. Illegal water use or poor management of water sources for agricultural activities makes water use in Egypt inefficient and due to geological conditions, salt ingress in the available (underground) water basins is a permanent threat for plant growth and yields. In addition, the already current scarcity of water is expected to rise dramatically when a new Nile dam in Ethiopia will be completed. For Egypt, the first negative effects of this dam are already expected in 2015.

The agri-production in Egypt can be differentiated roughly in traditional farming and more modern i.e. high-tech farming. Traditional farming is done by small farmers that are in general rather poor, have small plots along the Nile and in the Nile-delta region, use very basic agriculture techniques (hardly no mechanization), are badly organized and have no marketing focus and thus no company strategy (no agribusiness focus). A lack of strategy means that awareness or knowledge on what variety to grow, what quality to produce and what practices in terms of pest management to use for optimal growth and marketability. In addition, these farmers need more awareness or incentives that their actions have large impact further up in the supply chain. Some even think backwards: they save money on inputs (reduce manure or fertilizers or pesticides, reduce straw, choose cheap packaging or even avoid it and sometimes try to save on energy like cooling costs). To summarize, there is a lack of knowledge how such actions impact on yield, quality and post-harvest losses.

Given the existing state of the fresh supply chain, there is a need for incentives to change this practice and this could be realized via extension services with the right skills, education and training to make these farmers more aware of supply chain effects. But changing behaviour is difficult: the small farmers have no cash, no access to new varieties and have often no other option than to sell to middle man (traders), which makes them very dependent. The latter are in general not transparent to farmers about: market pull, market prices, good practices, closing the cold chain, good packaging etc.. This attitude from the middle man assures their profitable position in the food supply chains. Because of all these factors: small farmers do not have any incentive to innovate or ways to change attitude or keep post-harvest losses (PHL) as low as possible.

Incentives could come from activities that create trust like: pre-payments based on market pricing (via contract farming), direct payments, adequate packaging, chain transparency (via apps!) etc.. To improve small farmer chains a clustering system is required that controls quality (sorting, cooling, packaging), is able to safeguard local collection into bigger volumes and is also able to make prices more transparent. Only when small farmers would be able to organize themselves in cooperatives, this could lead to incentives such as described above. However, the present regulation on cooperatives first needs to be changed: current existing cooperatives are only allowed for the supply of seeds and fertilizers and do not have the mandate to support market access, quality control, storage facilities, good packaging etc.. A new initiative from the Dutch Ministry of Economic Affairs has been started to explore innovations in cooperative “New style” development in Egypt.

Large scale high-tech farming and knowledge development how to use these technologies is nevertheless applied and available in Egypt but is only used by farmers that produce for the export market. These export oriented farmers have big plots in the desert area (e.g. Nubarea region), use patented varieties, have well-organized supply chains, use knowledge by hiring international consultants and experts. The export farmers are fully focusing on export and are necessarily aware of specifications as demanded by the high-end markets e.g. they are certified for GlobalGap, BRC, ECO or other relevant certification systems. These export oriented farmers do not trust or rely on Egyptian based specialization in the chain and thus do not use service providers. In general these activities are organized by themselves. This is: sorting, packaging, (pre)cooling, storage, transport, quality analysis, phyto-inspections etc.. .

Quote: “It would be profitable to support quality analysis by creating common lab facilities”.

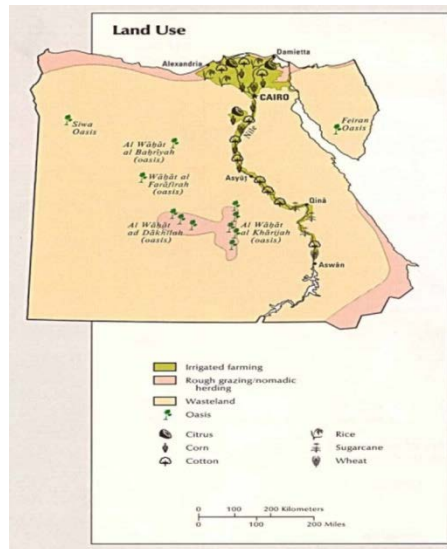
The first quality grade produce (suitable for export) goes to Europe (UK, Germany, NL), the second grade goes to the Gulf States, the remaining grade stays in Egypt for selling on the local markets. The investments in the indicated modern techniques require export markets/export prices for profitability. Depending on the product, the price for export products can be up to 4 – 20 times higher than the price these farmers can get on the local market. The export market is based on large scale production and big trade volumes, whereas the local market is in general characterised by small scale trade and maintains a complete scattering of the suppliers intact. The number of exporting farmers and companies in Egypt is relatively small. It is also estimated that this category still sells 15% of their produce on the local market. Such a release market is a prerequisite for a healthy export position of these farmers, especially when global markets suffer under price pressures.

There is a general opinion amongst the interviewees that there is a high percentage of food waste along the Egyptian supply chain, ranging from 20% (tomatoes) up to 80% for other products. These data cannot be verified, as no formal post-harvest losses monitoring systems are in place, but are rather estimates. Most interviewees refer to FAO statistics. The general opinion is that the efficiency in the national oriented F&V supply chain is very low, mainly caused by the scattered and small scale production and the huge amount of small farmers involved in the local part of the food chain.

The economic losses of post-harvest losses may not be so bad as often is thought by following value chain ideas. The reason could be that the value of food waste is relatively low due to the low prices (i), the price for energy is relatively low (ii) and possible wastage collection at farm level for making value out of the waste stream is a logistic problem and is not developed (iii). Only when farmers would organize in collectives or cluster activities and collect big volumes, only than waste collection could become feasible. New regulations on cooperatives are required to make this value chain approach feasible. The Dutch Embassy is involved in advising how to set up cooperatives “new style”.

Other food waste causes are coming from a lack of knowledge, a lack of stock facilities (especially cold stores) and a lack of chain integration (no information sharing: transport, packaging, stocks etc.). Supermarkets contribute to a certain extend to waste as they do not create enough cooling space in their shops (both backroom and display). Only a small percentage of trained personnel have Supply Chain Management experience. These qualified persons mostly work for multinational retailers and have been educated by courses on holding level but often without a clear focus on fresh product handling. Short practical and dedicated courses could strengthening skills in handling fresh produce.

Figure 1 shows the production areas of fresh fruits and vegetables along the River Nile, the Nile delta and in the desert, outside but near the Nile delta. The latter region seems to produce the highest quality and quantity.



Source: <http://www.fao.org/ag/AGP/AGPC/doc/Counprof/Egypt/Egypt.html>

3.2 Collection center

Modern export oriented farmers have own facilities: harvest machines, pre-cooling equipment, cold stores, sorting machines, packaging machines, pack houses, dock shelters etc.. Small farmers are very often dependent on the availability of commercial collection systems for their produce. Sometimes the modern farmer links small farmers to their facilities to raise the export volume. Small farmers either sell via traders (middle man) or bring their produce directly to the wholesale facility near Cairo. Obur is the biggest wholesale market and is managed and owned by governmental bodies.

3.3 Transport & distribution

The transport of fresh produce in Egypt is restricted to road transport and is either organized by the farmer himself, a service provider or by the supermarkets' own transport trucks. Transport by the farmer is mostly done in open trucks and uncovered baskets or crates are used (when available). Service providers use open or cooled trucks, supermarkets mostly use cooled trucks. Transport companies do not have a focus on quality or any knowledge about this subject. This awareness should be initiated by the farmer or by the buyer depending on who has to organize the cooled transport to the wholesale location.

Transport from the northern production areas to Cairo is complicated due to bad roads and heavy congestion due to traffic. It would therefore be better to organise collection and refrigerated transport in the production areas and send the produce to collection centres, ideally built on strategic locations near the city, having dock shelters, cooling facilities, forklift trucks etc. available. Such a concept would take away many vehicles from the congested roads and close the

cold chain to a certain extent, rather than transporting directly from farmers to individual outlets. However, these DC-facilities are scarcely available. For frozen products this is different: warehouses are present. An idea was to combine warehouses for frozen with extra space for the handling of fresh produce. The warehouses do not have (yet) a strong position in the fresh fruit and vegetable supply chains of Cairo.

The initiative of the development of multi-modal freight transport options using The Nile by means of barges or make combinations of river, road and train transport is mentioned but it is unclear what the status of this is. Railway transport is seen as relevant as Egypt has the most extensive railway network in Africa. (Buck report 2013: Agri-logistic event Cairo).

Despite the relative low fuel costs in Egypt, truck transport costs have increased by 40% over the last years. Especially due to traffic jams and subsequent delays, truck drivers need to make more cycles and have to carry more load (20 tonnes trucks) but still face a fragmented product supply. This situation reduces a quality focus by the transport sector. There are services providers available to provide cooled transport, but these are limited. There seems to be a shortage in cooled trucks, so there is a lack in refrigerated transport competition. City distribution is inefficient due to the complete traffic chaos in down town Cairo. Stimulated by the traffic congestions a new trend is growing and that is home delivery. A clear example is McDonalds who delivers more than 50% of their orders via home delivery transport.

3.4 Wholesale centres near Cairo

Near Cairo, there are 2 wholesales centres: at 6th of October and at Obur. They are open and allow trade for 24 hours a day. They both have no adequate cold store facilities. Most traders bring produce to the wholesale centres and after sales, they might bring the produce to the buyer or the buyer brings it home by him selves. Logistics are regarded as very poorly organised and not covered by a kind of master plan.

3.5 Retailing in Cairo

The fresh produce is sold via 3 different types of outlets:

- 1) Formal markets:** (Consumer image: not fresh, but food is considered more safe)
 - Hypermarkets (11 outlets): Makro, Carrefour.
 - Supermarkets (Makro, Carrefour (25), Metro, Saoudi (8 stores), Alfa (6 stores, 15 corners), BIM (outlet no.: not available)
 - One-stop-shop; cooled displays especially for fresh cuts available
 - Favourite outlet for middle and higher income customer: a fast growing group of consumers in Egypt.

- 2) **Informal markets:** Image: fresh and tasty products
 - Open market/wet market, street & car vendors, stalls.
 - Dirty, bad hygiene and women unfriendly (many women try to avoid buying there)
- 3) **Groceries:** Image: not so fresh, sometimes essential products (tomatoes) not available
 - Minimarket, basement sales: around the corner

Especially supermarkets have a good potential to organise closed cold chains; fact is that volume wise supermarket penetration with regard to perishables is still a low percentage in the whole fresh food supply (estimates: 1-5%). The interviewees provided conflicting opinions about the growth potential of retailers: fresh products through retail will not grow very fast due to the large informal food market vs. brilliant opportunity already on the short term for servicing a fast growing group of wealthy consumers that want a better fresh quality and more convenient products in supermarkets and are willing to pay a good price for it.

The quality performance of the formal markets i.e. the hyper & supermarkets seems to be quite high but does not meet European food safety (MRL) standards. To be able to compete on price with street markets, retailers in Egypt use other limits for acceptable MRL levels, although most of them do have certification and are subsidiaries of European holdings.

To improve the consumer's notion on quality, retailers could promote that their produce is more safe and differentiates among other quality aspects and convenience. To make the produce more safe (lowering the MRL's), there is a need for better communication to the farmers: what pesticides/fungicides are allowed (on the list) and when is spraying allowed and when it is not? A quality control system for local-to-local sold products is apparently not in place or is not applied.

New supermarkets that want to enter the Egyptian market need good business plans and a strong local partner to trespass bureaucracy. Regulation is strict and the actual city policy in Cairo because of tremendous traffic and logistic problems is: not to allow any new supermarket in the city centre. However retailers are allowed to establish outlets in the suburbs like in New-Cairo, Smart City or 6th of October. Several retailers failed to enter the Egyptian market successfully due to political intervention (Sainsbury closed 100 stores in 2004). Others are capable in arranging better (political) connections like BIM from Lebanon.

It is stated that the out-of-home and catering market (schools, canteens etc.) is a very big market in Egypt and this market desperately needs more regular volumes of safe and high quality food. Consistency of food quality is the key word here. The growth potential of a caterer like Cairo Kitchen is determined by the availability of fresh, safe and tasty food which can be sourced from reliable farmers and do have options for an efficient logistic system. The gap between export priced but safe products and local products is still considered too big to source as an alternative from export farmers and overcome the food safety issues and logistic problems by paying an export price.

3.6 Consumers

Egyptian population grows annually with 2%. Actual prices for fruits and vegetables are regarded as high due to a long period of price inflation and fluctuations during the year. Egyptian consumers have a long tradition of buying fresh and tasty food. They are used to go to the specialized small nearby (street) markets. The perception of fresh produce sold by supermarkets is therefore that supermarkets offer a less fresher product than when bought from grocers and/or from more informal markets. So chain innovations should match this tradition, rather than the introduction of innovations in only far-away or in formal markets. Low budget oriented consumers are not used to pay a high fresh food price, but more wealthy consumers are definitely willing to pay almost any price for quality, safety and convenience. Quote: “price for good food is no issue at all”. However, it seems that the wealthy consumer population in the Cairo society is still a relatively small fraction and will not be able to change the fresh food supply and policy very easy. Therefore, product innovation in Egypt is still at its infancy.

Some interviewees pointed at the huge amounts of tourists that come to Egypt. This typical consumer group bring in high demands on food quality and are extremely sensible for safe food. It is estimated that about 80 million tourists come to Egypt every year. Because of the actual political situation there is now a dip in these numbers but it is regarded as a temporary situation.

3.7 Metropolitan food systems

The interviewees advice strongly to look for the combination of introducing novel (safe) food production systems and offer these as a start to the most wealthy consumer group in Egypt i.e. the tourists. Tourists via hotels, resorts and restaurants are willing to pay a good price for fresh, high quality and safe food.

In order to demonstrate a chain innovation like an agro-park (modified for Egyptian market dynamics) or a metropolitan food production systems (see for a more elaborate description: appendix 2), the best introduction area is nearby a concentrated touristic area such as Sharm-el-Sheikh. This location allows the introduction of a relative small and therefore feasible scale and it solves or combines many other value chain aspects.

To anticipate on current clean and sweet water problems and the expected future scarcity of sweet water the interviewees propose to invest in new technologies like hydroponic production units. Such units are able to produce various fresh products, especially lettuce, without the need of using (fertile) soils without the need of large water amounts for efficient plant growth. To maintain moderate growing temperatures (for year round production) in a very hot desert climate such units may need placement in covered and/or in climatized areas.

A hydroponic growing system uses minimal amounts of water because of the use of recirculation pumps and filters that control and purify the substrate water. The necessity to use the system in a protected environment (in a greenhouse concept or in an isolated storage room using multilayer system with artificial light is very much depending on availability and price of energy. Alternative energy sources for cooling and light could be included in the concept: cooling/heating and fresh water supply could be generated by solar or deep sea technologies. The latter may be combinations with desalination systems enabling the making of fresh water from sea water (Red Sea).

Current Dutch hydroponic systems are developed and made operational for Dutch circumstances and price levels. For commercial use in Egypt, the Dutch hydroponic concept needs to be adapted to the typical local Egyptian situation. Many threats and thresholds are thinkable but interviewees see big opportunities for these systems in the future and motivate this with the serious lack of water argument. They also stated that Egypt should start in time with thinking and realisation of initially small scale novel food productions systems in order to be independent and to be prepared for future food security issues. It is regarded as a necessity not to be dependent on knowledge that exists only outside Egypt.

Hydroponic growing units might be a good option to deal with a long list of practical supply chain constraints and demands. But as all new systems there is always the disadvantage of the small scale of economy and the lacking knowledge which is necessary to build, use, maintain and explore such systems. On the short term it is therefore impossible to produce at the same price levels as traditionally produced fruits and vegetables. But this should not hamper the development of such systems as they may be crucial for future food production.

The arguments to concentrate on the development of hydroponic systems are:

- The concept deals with the expected water shortage (emphasized by the interviewees as very serious)
- The concept enables fresh food production very close to consumer concentrations
- The concept is a good option for safe food production
- The concept tackles logistic problems

- Developing or adaptation of existing concepts will start a new field of agricultural knowledge which might be very strategic for Egypt
- The concept enables waste stream valorisation options depending on the commodity

The highest tourist concentration in Egypt can be found in Sharm-el-Sheikh in the southern part of the Sinai with more than 200 hotels, apartments and resorts for tourists in a relative small area. A novel food production system (hydroponics, possibly combined with a climatic controlled environment) could be best developed and introduced in that area. A future transition towards bigger production systems and then transferred to the Cairo region could be a next but far away step. For this transition, lessons learned from the Sharm-el-Sheikh prototype are prerequisite for the second generation of this technology in Egypt or more general: in desert area.

NB: Products from a high tech hydroponic production unit near Sharm-el-Sheikh will face competition with traditionally grown products coming from the traditional production regions in the North of Egypt which is at a distance of 800 km. from Sharm-el-Sheikh. These products are usually transported by trucks.

A simplified (micro-scale) form of a hydroponic system is the roof top gardening concept which is launched in Cairo. It has already drawn attention of policy makers, NGO's, entrepreneurs and potential users (roof top owners). Two different roof top gardening systems are mentioned. One is calling itself successful and has been growing since the start while the second, almost similar system seems to stagnate in its development. This may be due to different investment and business plans where the systems are based on. Volume wise the roof top production is still very limited. It is unclear how many roof tops are available and how much interests this will gain from people with a "city" mentality.

4 Supply chain improvements

The opinions, facts and feedback from the mid-week workshop that have been gathered during the study have led to a list of proposed initiatives to improve current fresh food supply chains or to introduce new promising production systems that adapt to possible food security issues in the future. A prerequisite is that these initiatives should aim at strengthening the:

- agro-logistic system,
- the post-harvest knowledge base,
- the removal of current inefficiencies in the Cairo food supply chains or
- the launch of designing novel food productions systems that demand less water use or less land area.
- the options for river and train transport and other multimodal combinations

The following list of initiatives are considered as potential and could get commitment from the relevant stakeholders.

4.1 Proposed initiatives

a) Setup Fresh Food Network Egypt (FFNE)

Organize a round table on agri-logistics including a number of middle and large scale farmers, local retailers, counselling bodies (with practical knowhow), the National Food Chamber, store owners, transporters, other service providers, relevant governmental bodies etc..

Discuss then contra-productive policies, desirable new legislation, desirable fresh chain networks following the idea of how to take away current food supply chain obstacles. Most impact is expected when such a network or platform is mainly driven by private companies with an agri-business mindset rather than a traditional farmers mentality.

The outcome of such a agri-logistic network activities (*Fresh Food Network Egypt*) should lead to an industry based but broadly shared *national or regional vision on agri-logistics*. To avoid too theoretical (or desk) scenario's the outcome must include practical activities and plans for pilot projects to prove that local Cairo food chains can be improved by chain integration. Allow these plans to start on a short term.

NB: Inclusion of Dutch lessons learned to build on such an agri-logistic strategy and to design effective chain oriented pilots is advised.

b) Pragmatic pilot

Organise and perform a first pragmatic supply chain *pilot study* having the following characteristics:

- a. Develop a business plan for an improved supply chain, based on verified, real or best estimates of supply chain data (including market information).

- b. Based on supply chain data, focus on the most promising crops; select a limited number of interventions; demonstrate the improved supply chain in the real world: e.g. the effects of closing the cold chain, improved sourcing, better packaging and/or testing of an improved market model or others. To be agreed on by local (chain) partners (partnership).
 - c. The partnership must express commitment to support the plan: sourcing from own growers, using own service providers and their sites (DC's) at strategic locations etc.
 - d. Perform demonstrations and trials and use modern technology for monitoring: GPS-tracking, temperature loggers etc.
 - e. A pilot consortium has the following members: a retailer or wholesaler (i.e. a mandated category or a supply chain manager), technology providers, service providers and food suppliers. In the pilot the participants must be willing to adapt to an alternative way of working compared to the current logistics. The forming of the consortium seems to be only feasible when the retailer or wholesaler is in the lead and allows the presence of others to become active in their supply chain. A real life test is only valuable when business solutions are included. In addition, it must be clear how the (research!) costs and the risks (like food losses due to unforeseen disasters in the test phase) of such a pilot can be funded: are there options for PPP's (public-private-partnerships) who is the funder, who is the (pilot) chain master and which (local) research group is able to conduct tests, gather the essential data and is able to report the results of the pilots.
- c) Skills Improvement
- a. Introduce a basic and practical "*post-harvest technology course*". This course should include the principles and basics of and use of PH-technology like:
 - cooling, sorting, storage, packaging, transport
 - quality control, decay prevention, ripening control
 - supply chain management.

It could be helpful to connect to existing education services (such as HEIA) and their training infrastructure and explore collaboration options where none HEIA members can be invited as well. HEIA is the Egyptian export association for fruits and vegetables. (Information: <http://www.heiaegypt.com/>).
 - b. Connect the Dutch *Network of Excellence (NoE)* Postharvest Food Losses initiative from the Ministry of Economic Affairs and from the Ministry of Foreign Affairs to interested Egyptian stakeholders (e.g. HEIA or others like a local research group experienced in food chain development and having a good sector network) to enable efficient match making between knowledge seekers and knowledge providers. The NoE offers Dutch businesses, agencies, technology & service providers and knowledge institutes a platform to offer their solutions for better postharvest operations. NB: the Network of Excellence is currently under construction and is targeted to be a web based portal focusing on food supply chains in emerging and developing growth markets.

c. Explore options for other *in-company* or *on the job* trainings and *train-the-trainer* activities. Target groups: industrial employees, quality managers, post-harvest consultants, local academia and policymakers.

d) Supply Chain Innovations

Develop *supply chain innovations* that adapt to Egyptian circumstances. WUR launched an idea of creating (semi) mobile outlets with cooling on board and to be deployed in sub-urban compounds. Such a novel outlet concept ensures a high quality food supply (closing the cold chain) and offers at the same time a solution for many Egyptian women who fear for harassments, which is apparently unavoidable in other outlets. So this idea would solve a gender issue (i), elevate product quality (ii), solve a logistic problem (iii) and create a novel outlet concept (jobs!!) (iv). *Other supply chain innovations* are: make other services mobile. Mobilisation is an idea that can be easily generalised and applied in other parts of the supply chain as well. Think of temporary use of: a mobile packing station (i); mobile post-harvest labs/test centre (ii); mobile processing units (iii); mobile pre-cooling units (iv), mobile training centre (v) etc.

e) Novel Production Systems (NPS)

To anticipate on novel production systems, a pre-feasibility study on hydroponic fruit and vegetables growing is advised. This pre-feasibility should include:

- a. Gathering and collection of real or best estimates of supply chain data for the Sharm-el-Sheikh region. Estimate basic market potential for NPS for 1-2 pre-defined products.
- b. Visit region and estimate technological potential of hydroponic production and develop ideas for supply chain setup.
- c. Organize a meeting in Sharm-el Sheikh and discuss NPS with potential stakeholders and candidate partners. Potential partners must express commitment to support further planning on NPS.
- d. Advise potential for a hydroponics feasibility study.

4.2 Schematic overview of follow up options

All the aforementioned ideas as mentioned in § 4.1 are put in a tailor made framework for the Egyptian fresh food supply chain (see below, figure 2). It can be interpreted as a schematic view how to put the various options for supply chain improvement in a coherent Egyptian agri-logistic perspective.

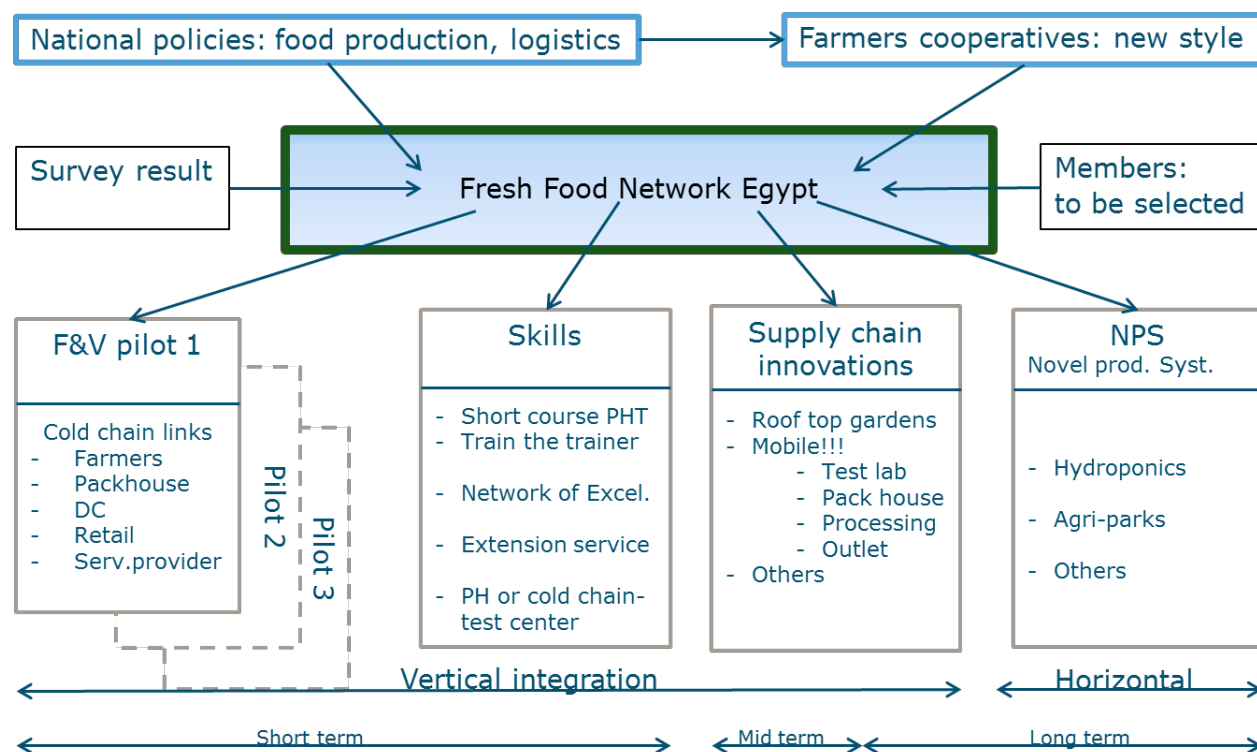


Figure 2: Output of a quick scan inventory aiming for food supply chain improvements in Cairo

Starting point is that all suggested agri-logistic improvements for the Cairo food chain can be developed through an integrated master plan. Separate improvements can also be initiated but need strong commitment from potential partners. The framework is a result of this mission, but the basic structure is coming from lessons learned in previous missions and have led to an advanced FBR view how to put agri-chain logistics and developments in a broader perspective.

This is to avoid stand-alone initiatives that might be endangered by a lack of sustainability. Many examples in developing countries demonstrate that embedding of initiatives in bigger structures is the only way to success and sustainability.

5 Recommendations

This report provides an overview of options to improve the Egyptian post-harvest food supply chains. These options are structured and hierarchically organized in a schematic overview. To schedule these activities in time, it is suggested to plan according to expected **commitment** from local and international partners. The most committed references received in the quick scan were made for the following activities:

1. Perform a prefeasibility study on hydroponic lettuce production in the Sharm-el-Sheikh area.
2. With whom, how and when to launch Post-Harvest short courses and a NoE in Egypt? Start launch discussions with HEIA and survey strategic options.
3. Prepare a first fresh food network stakeholder meeting. Provided input for this meeting is a basic, but focussed, market survey executed by a local partner, with experience in a formal market supply chain.

6 Acknowledgements

The authors wish to express their gratitude to all persons who have been involved in this process: both for the input and for the ideas.

In particular our appreciation goes to Joost Geijer Head of Economic Department and Agricultural Counsellor and Marwa Hussein Abdel Fattah MSc for organising the quick scan programme and the invitation of all interviewees.

Finally appreciation is extended to the Netherlands Embassy in Cairo who offered excellent hosting facilities for the meetings making the visit most efficient.

Appendix I

1. Background of Metropolitan food clusters

1.1 Global trend

The world is undergoing the largest wave of urban growth in history. In 2008, for the first time in history, more than half the world's population lives in towns, cities and metropolis. By 2030 this number will swell to almost 5 billion, with urban growth concentrated in Africa and Asia ([UNFPH, 2008](#)).

The explosive growth of the urban middle classes is revolutionizing consumption patterns in terms of quantity and quality. Purchasing power growth revolutionizes consumption patterns, food consumption no less than other sectors. For food, the difference is not so much in the quantities, but first of all in the quality. Urban middle class workers need fewer calories from staple food as rice, wheat, and potatoes. They consume much more fruit and vegetables, meat and fish, and drink milk products, fruit juices, soft drinks, beer, wine and spirits. They do not accept health hazards and demand perfect freshness and excellent taste. Their food must be easy to purchase and prepare, and must be according to the latest fashion.

This changing patterns and quality demands generate much more added value in the food chain than the traditional system based on non-processed staple foods, traded by middle men. While volumes of food do not change much, the value keeps increasing. So the general growth of the total purchasing power of the middle class will certainly manifest itself in the food sector. As middle class development is an urban phenomenon in general, the major part of the explosive growth in purchasing power for food will concentrate in urban areas mainly.

1.2 Metropolitan food clusters

Metropolitan agriculture (highly productive, land independent) is a response to above described revolution. It is an agro-production system, able to satisfy changing and competing demands of the urban population on a sustainable basis. Greenhouses, intensive livestock and dairy farms are the modern expressions of metropolitan agriculture and they are inside the metropolis or in the green space surrounding it. The commodities that cannot be produced in these metropolises themselves, such as fodder, concentrates, and staple foods, is being supplemented by imports. The products, particularly suited to the area and hence abundantly available, are exported in return. In this way megacities establish another global network of agro-food chains that are integrated in the urban structure, from primary production of an enormous variety of food stuffs, via all kinds of processing activities, to trade and distribution. All along this chain added value is created, the more so when the highest standards of quality and market responsiveness are attained in each link.

Metropolitan agriculture can be defined as an agro production system able to satisfy the changing and competing demands of the urbanized population on a sustainable basis through new and intelligent connections inherent to the network society (between producers, sectors, raw materials, energy flows and waste flows, between stakeholders and between their value systems).

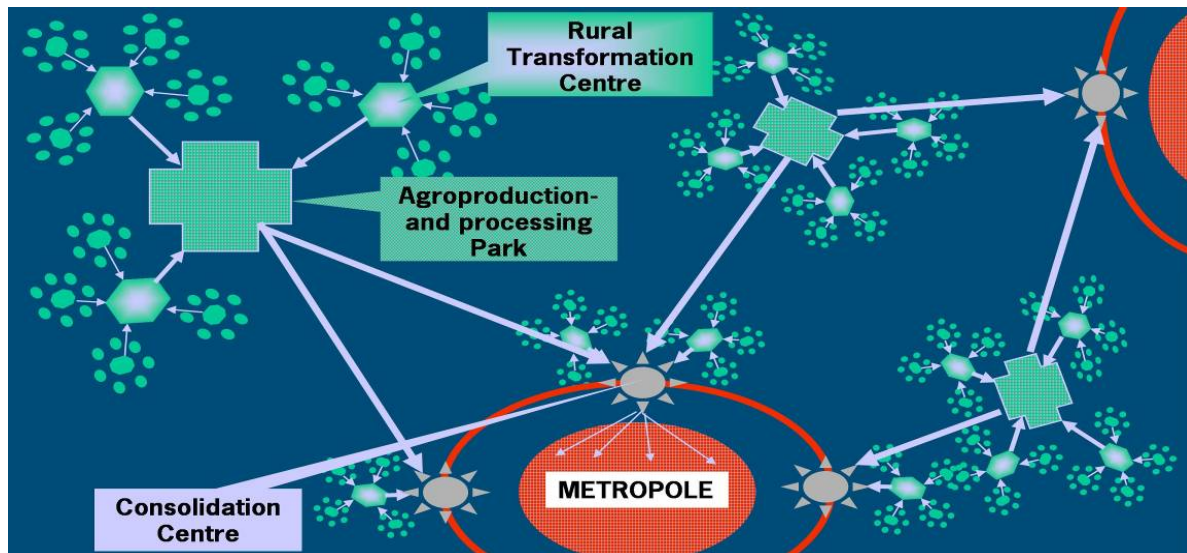


Figure 1: A Metropolitan Foodcluster is an agrologistic network that serves the needs of a metropole and consists of consolidation centers, agroparks and rural transformation centers.

Agriculture and logistics are very closely connected within metropolitan agriculture. A Metropolitan Foodcluster is an 'intelligent agro-logistic network' (Figure 1) and is composed of a number of agro production chains, that are connected through logistical operations and flows of knowledge and information. Typical components of the network are, at one end of the chain, production regions, centered on 'rural transformation centers', then at the other end 'consolidation centers' directly servicing metropolitan or export markets, and in between 'agroparks' forming the linking pin between the two. In consolidation centers products, both raw and processed, coming from the rural environment or from specialized agroparks, are combined with import flows, if necessary be processed further, and then recombined and distributed.

Perfect freshness and compliance with the highest quality standards are the key issues for operation. For that purpose consolidation centers need to be close to the metropolises. Rural transformation centers work as collection points from where primary products are transferred to other parts of the network. Rural transformation centers are the nodes where the inputs for the whole network can be sourced and where trading facilities will be located. They will also be the contact centers for contract farming and for training and education of farmers.

Metropolitan Food Clusters are demand driven. They organize consumer responsiveness throughout all seasons. What cannot be produced locally at a specific moment is organized into the system by global trade.

Of all the elements of the network, agroparks are the most innovative, linking supply and demand flows in entirely new ways. An agropark is a spatial cluster of high-productive plant and animal production and processing units in industrial mode combined with the input of high levels of knowledge and technology. The cycles of water, minerals and gases are skillfully closed and the use of fossil energy is minimized, particularly by the processing of various flows of residual- and byproducts. An agropark may therefore be seen as the application of industrial ecology in the agrosector. What is not available from the primary production areas around the rural transformation centers, will either be supplemented by concentrating import flows on the agropark, or intensive, high-tech production within the agropark itself. The third component of the agropark are its trading and distribution functions. These are closely related to the agropark's central point from which all information flows are directed, for the whole intelligent agro-logistic network of the metropolitan region.

1.3 Wageningen UR approach and track record

Wageningen UR is actively implementing research and design for innovations in metropolitan food clusters (MFC). Metropolitan food clusters are designed that contain intelligent agro-logistic networks of:

- Consolidation Centers which supply the metropolises in a consumer responsive way;
- Agroparks which cluster different plant and protein production chains, focusing on their waste flows according to principles of industrial ecology;
- Rural transformation centers that source raw materials from existing farmers while training them to improve productivity and to comply with stricter quality standards;

MFC design covers hardware as well as organizational aspects as business planning, permits and allowances as well as software aspects as training and education, communication and quality management. The Wageningen UR approach is integral and trans-disciplinary. Knowledge institutes, entrepreneurs, non-governmental and governmental organizations are all participating in these innovation processes.

We build global partnerships on our reputation of Wageningen UR network /the Netherlands, expanding the worldwide network of metropolitan food clusters.

Appendix II

Interview schedule

Sunday 24th November 2013

- 9:00 Mr. Angus Blair – Investment Adviser
10:30 Dr. Tarek tawfik - Cairo Poultry Managing director
13:00 Mr. Ahmed Tarouty - Tarouty farm Chairman & CEO (Dairy & Mushroom Production)
15:00 Mr. Mohamed Youssef - ICAPP Director of Agricultural Projects and Supply Chain

Monday 25th November 2013

- 09:00 Dr. Omar Abdin - Leaf's LLC- Managing Partner (Agricultural entrepreneur & Consultant)
10:00 Mr. Fathi Rashed- Supply Chain manager (Alfa Supermarket)
12:00 Mr. Zouhier M. AL Gharini -Logistics & Supply Chain Manager (Metro Cash & Carry Egypt)
13:30 Ms. Hagar Rakha - Program Manager-Desert Development Center The American University in Cairo

Tuesday 26th November 2013

- 09:00 Mr. Tom Andersen - Head of EIB Regional Office for the Near East
10:00 Mr. Mahmoud El shishiny- Marketing and Business Development – Magrabi Agriculture (MAFA)
12:00 Mrs. Iman Kamel, Executive Director of Horticultural Export Improvement Association (HEIA)
15:00 Mr. Philip ter Woort - European Bank for Reconstruction and Development Director

Wednesday 27th November 2013

- 10:00 Meeting With Dr. Assem El Gazar - General Organization for Fiscal Planning – Chairman
11:00 Meeting With Mr. Raaouf Abdel Messih – Technoram Holding chairman (Logistics & distribution Centre)
13:00 Meeting with Ms. Nadine -Cairo Kitchen owner (Catering)
14:30 Meeting with Mr. Magdy Ramsis -Swiss Restaurant purchasing Manager (Catering)

List of attendees in workshop:

1. Ambassador (Gerard Steeghs)
2. Joost Geijer (HEZ)
3. Marwa Hussein(AA)
4. Mr. Tarek Tawfik (Cairo Poultry Group)
5. Mahmoud El Shishiny (MAFA)
6. Mr. Zouhier M. AL Gharini (Makro)
7. Mr. Tom Andersen (EIB)
8. Mr Willie van den Broek
9. Mr. Henry Boerrigter
10. Dr. Johannes Maria Soet
11. Mr. Mohamed Shoukry (Food Chamber)
12. Omar Abdin
13. Mr. Philip ter Woort – EBRD
14. Christer Schyberger

Thursday 28th November 2013

- 10:00 Mrs. Mirette El Hariri (marketing and purchase) and Mr. Mahmoud i. Zada
(man. directors) Alfa Market Retail
- 14:00 Mr. Magdy El Sebaie – Egyptian Dutch Chairman (Fish Feed
Production)
- 15:00 Mr. Dr Osama El Behairy – Roof Top Gardening