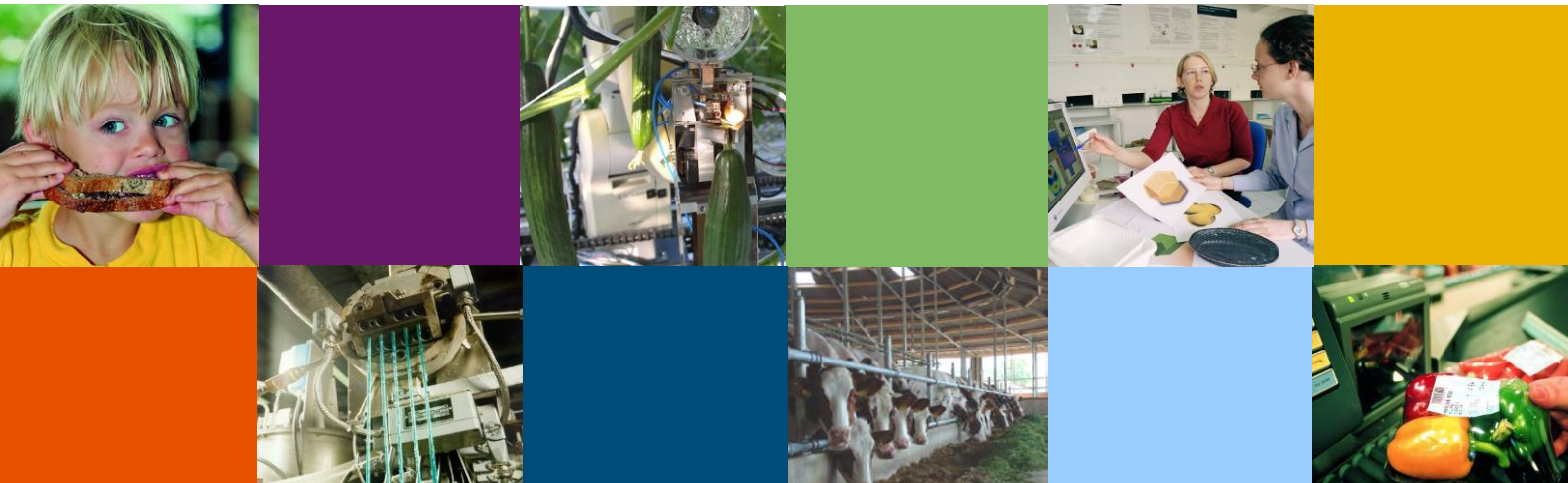
FOOD & BIOBASED RESEARCH
WAGENINGEN UR

Metropolitan food supply in Egypt

Market analysis hydroponics production for selected urban areas

Nina Waldhauer
Han Soethoudt

Report 1551



Colophon

Title	Metropolitan food supply in Egypt. Market analysis hydroponics production for selected urban areas
Author(s)	Nina Waldhauer, Han Soethoudt
Cover picture	Credits: Bustan aquaponics
Number	Food & Biobased Research number 1551
ISBN-number	978-94-6257-405-2
Date of publication	February 2015
Confidentiality	No
OPD code	OPD code
Approved by	Nicole Koenderink

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

Summary

This study investigates the potential for hydroponics products in Egypt focussing on the geographic areas of Cairo, Hurghada, El Gouna and Sharm el-Sheikh and looking at the tourism sector (hotels and restaurants) as well as the retail sector.

Hydroponics is a very interesting production system for Egypt because it addresses the expected future water shortage of the country, it enables fresh food production very close to consumer concentrations and it produces in a safe and controlled environment.

There are about five to ten hydroponics farms currently producing at a very small scale producing less than 0.5% of the total lettuce production in Egypt. They are not able to cover the current demand. Furthermore, all farms face similar production issues mainly going back to three factors, namely the small scale hydroponic production, the limited experience with these production systems and current regulation and laws.

Currently, the farms exclusively supply Cairo metropolitan area and mainly cater to the upper-class consumers, the main market channel are hotels. As for market potential the largest potential is considered to be in the retail sector of Cairo. The tourist areas of Hurghada, El Gouna and Sharm el-Sheikh are less interesting as most hotels offer all-inclusive packages and thus hydroponics has to fit very well into the general proposition of a hotel in environmental sustainability or health aspects to be of interest.

Content

List of figures

List of tables

Acknowledgements

This study relies for a significant part on information of Egyptian hydroponics farmers as well as individuals from the hotel and retail sector. We wish to express our gratitude to them for being willing to share their information and experience with us. In particular we wish to thank Tamer el-Meehy and his team of Entrust DMC for the excellent field work in gathering information from the Egyptian parties. Furthermore we wish to thank the Dutch Embassy in Cairo who not only initiated and financed this study but also gave excellent local support whenever necessary. Finally, we thank everyone who has thought along this research, shared ideas and given feedback on concept, intermediate results and resulting conclusions and recommendations.

1 Introduction

1.1 Background

Worldwide two major population trends can be identified in recent times that heavily impact each other: Not only is the world population increasing tremendously with an expected 9 billion people in 2050 but also we are undergoing the largest wave of urban growth in history. In 2008, for the first time in history, more than half of the world's population lived in towns, cities and metropolises. By 2030 this number will increase to almost 5 billion with urban growth concentrated in Africa and Asia ([1]). The urbanization is accompanied by growth of the urban middle classes and thus increase of the purchasing power. All these developments lead to changes in the consumption pattern for food (as for other sectors): the necessary quantity of food will increase but the most significant changes are to be expected in the demanded quality of the food. 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 reflect the latest fashion in food [2].

These general developments can also be observed in Egypt with the explosive growth of the total population of the country and significant enlargements of urban centers. The demand for fresh food of high quality and taste increases and first local initiatives can be observed that answer to these demands, especially catering to the upper class of the Egyptian society who has both awareness of the problem and enough wealth to pay for more expensive products [3]. However, these developments are too slow to solve the problem in the near future and thus the problem is only increasing. Therefore the agricultural office of the Dutch Embassy in Egypt in close cooperation with DGAGRO of the Dutch Ministry of Economic Affairs has been developing a program on agrologistics in Egypt since June 2012. The program is targeting the improvement of food security in Egypt in general and the reduction of post-harvest losses in particular as major gains in securing food supply of the population are expected in this area.

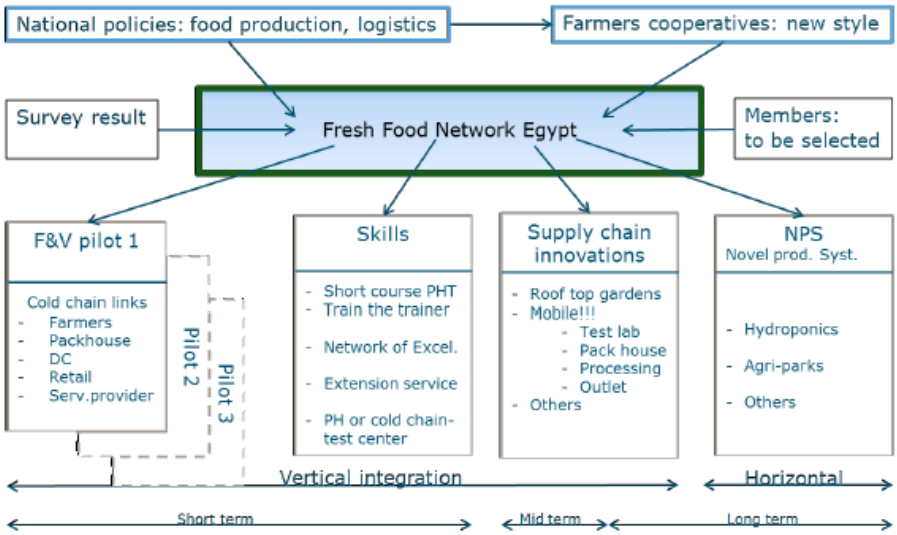


Figure 1: Output quick scan inventory aiming for food supply chain improvements in Cairo (source [4]).

Within the mentioned program of the Dutch Embassy two field visits of agrologistics experts of Wageningen UR/ Food & Biobased Research took place in December 2013 and in September 2014. A quick-scan inventory resulted in the identification of further actions for strengthening the food supply chain in Cairo in particular and Egypt in general (Figure 1

Figure 1: Output quick scan inventory aiming for food supply chain improvements in Cairo (source [4]).

). The introduction of novel production systems and, in particular, hydroponics production was identified as being highly interesting to Egypt ([5]). With less than 3% of Egypt's land being arable and only the Nile Valley and the Delta being suitable for traditional agriculture Egypt needs to look for new production technologies. Add to this the significant shortage in fresh water, the heavy use of pesticides in agriculture that strongly affects the quality of the soil and causes pollution of the Nile, and the growth of urban areas that take over more and more of the arable land, and it becomes clear that hydroponics production could offer contribute to solving at least some of these problems by reducing the use of water and harmful chemicals and avoid soil and water contamination.

1.2 Objectives

As a general statement it can be said that the market structure for fresh food and vegetables in Egypt is rather unclear with very limited figures being available on national level. Thus, before further sharpening the concept of a pilot on hydroponics production of leafy vegetables it is important to gain more insight into the current situation and the market potential for hydroponically grown vegetables in order to answer the following questions:

- Is the market for hydroponically grown vegetables in Egypt interesting enough to increase production and introduce new technologies and concepts?
- Which distribution channels and target customer groups offer the best market potential for hydroponically grown products?

Consequently, the objectives of the present project are

(1) To assess the current hydroponics market in Egypt;
(2) To determine the future market potential for hydroponically grown products;
(3) To give recommendations as to possible actions for supporting and strengthening the hydroponics agriculture in Egypt.

This research is commissioned and supported by the Dutch Embassy in Cairo who is the main target audience of the results. However, the gained insight should also be useful to the Egyptian (hydroponics) agriculture businesses as well as to Dutch businesses acting in this sector and being possibly interested in activities in Egypt.

This research builds for a large part on data which was gathered from Egyptian parties. For confidentiality reasons the interviewed parties will not be named in this report. The interviews were done with representatives of the following:

- Four current hydroponics growers in the Cairo metropolitan area;
- Three high-end hotels in Cairo;
- Four high-end hotels in Hurghada;
- Five high-end hotels in El Gouna;
- Four high-end hotels in Sharm el-Sheikh;
- Two organic retailers in upper class Cairene neighborhoods.

1.3 Scope and definitions

The market study will be a high-level study showing the hydroponics market in an indicative manner. As the study is mainly intended to serve as an input for taking further scoping decisions regarding a pilot and for involving possible business partners a high-level analysis is considered sufficient for taking the next steps towards such a pilot. Furthermore, as official and reliable figures on agriculture and consumption are hardly available in Egypt, the study will mainly be based on interviews with a representative selection of businesses in the field.

The project has further the following scope:

- Product group: leafy vegetables[1]
- Geographic areas: Cairo metropolitan area; Hurghada/ El Gouna; Sharm el-Sheikh[2]

[1] Based on earlier information leafy vegetables is the most suitable product group for hydroponics production, which is the reason for this scoping decision.
[2] Based on expert interviews during the second field trip in September 2014 these three areas were identified as the most interesting opportunities. Sharm el-Sheikh and Hurghada/ El Gouna as tourist resorts are interesting areas for setting up pilots with high-end technology with Sharm el-Sheikh being at an even higher distance from Cairo, the national wholesale market and the main production areas. Cairo is interesting as it targets business travelers as well as the Egyptian wealthy class and expats residing there.

1.4 Report outline

Chapter 2 describes hydroponics production and its main advantages for the Egyptian situation. In chapter 3 the current situation of hydroponics production in Egypt is summarized including the main constraints farmers are facing at the moment. Chapter 4 gives an overview of the current market for hydroponics and analyses potential future markets. The results are summarized in chapter 5 offering conclusions and recommendations based on the findings of the previous chapters and giving an outlook into further options for intervention to support the hydroponics sector in Egypt in its development.

2 Hydroponics: A promising technology for Egypt

Based on 2000-2002 data Egypt uses (withdraws) 68.3 billion m^3 of water per year compared with 57.4 billion m^3 of water available, which implies significant re-use. Agriculture uses 59 billion m^3, industry 4 billion m^3 and municipal 5.3 billion m^3 [6]. The yearly replenishment comes almost exclusively from inflows of the Nile, namely 55.5 billion m^3. To anticipate on current clean and sweet water problems and the expected future scarcity of sweet water[3] new technologies like hydroponic production in closed production units might be an attractive alternative to the current traditional farming. Such units are able to produce various fresh products, especially lettuce, without the need of using (fertile) soils and 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 acclimatised 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. Plants are placed in nutrient-enriched water. Sometimes these systems also use inert mediums such as gravel, sand or vermiculite. The plants placed in the water easily absorb the nutrients. Once the nutrients in the water are used up, it is recycled or additional nutrients are added. The closed water circulation system leads to water being used more efficiently than in traditional farming as in traditional farming water not being taken up by the plant will be released into the ground and is thus wasted. The necessity to use the system in a protected environment (in a greenhouse concept or in an isolated storage room using a multilayer system with artificial light) is very much depending on the availability and the 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, e.g. the Red Sea.

Figure 2: Hydroponics production of lettuce (Fruit Logistica Berlin 2015)

A specific soil-free method of cultivating crops is aquaponics, which is used in Egypt as well. The major difference between the classic hydroponics and aquaponics is that aquaponics integrates a

[3] The Egyptian government fears in particular that the 'Grand Ethiopian Renaissance Dam' currently under construction on the Blue Nile River in Ethiopia, will have significant negative influence on the water flows to Egypt.

hydroponic environment with aquaculture, the process of cultivating fish. It combines hydroponics and aquaculture in a controlled environment to create a balanced ecosystem that benefits crops as well as the fish.

Remark: In the following aquaponics is not considered separately but as a part of hydroponics, unless it is relevant to specify.

Hydroponic growing units might be a good option to deal with a long list of practical supply chain constraints and demands. The most important arguments to further develop hydroponic systems in Egypt 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 and thus can tackle logistics issues.
- The concept is a good option for safe food production of high quality.

As with all new systems there is the disadvantage of small scale 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. Nevertheless this should not hamper the development of such systems as they may be crucial for future food production.

3 Hydroponics production

3.1 Current situation of production

Hydroponics production in Egypt is currently limited to between five and ten farms. The farms introduced the concept of hydroponic agriculture in order to offer the consumer a better quality product than what is currently available on the shelf since their product claims quality and safety. In addition to the marketing aspect hydroponics production results in a higher yield per unit area than traditional agriculture. Water savings are an added advantage for the farms.

Most farms grow different types of lettuces (iceberg, romaine, Batavia and oak leaf), herbs (sweet basil, cinnamon basil, purple basil, marjoram), kale (Russian Kale and Tuscan Kale), chard and baby leaf salad mixes. Financially it is not very interesting to grow iceberg lettuce using a hydroponic system due to its longer growing cycle duration and its lower retail value compared to other lettuces.

Figure 3: Bustan aquaponics farm, Cairo (credits: Bustan Aquaponics).

In Egypt vegetables are eaten in significant volumes (see section 4.1) but looking at production and international trade data (see Appendix A) lettuce seems to be a minor product, indicating that this type of vegetable is not among the favourites of the Egyptian consumer. Hydroponic farmers try to turn this around by marketing not only their products as compared to traditionally grown products but seducing the consumer to consume more of the product and adapt their eating habits. Product varieties that are not common to the market (e.g. kale, butterhead lettuce, oak leaf lettuce and chard) add another edge in marketing as consumers are constantly looking for new greens.

In 2011 tomatoes and onions accounted for more than 50% of the total agricultural production in Egypt whereas lettuce amounted to only 0.5% (c. 94,344 tonnes) (see Appendix A Production and trade data vegetables in Egypt. Below the production and planning of two hydroponics farms is shown (Table 3.1). In 2014 these two farms produced 90 tonnes of hydroponics in total, mostly lettuce. With an estimated amount of five to ten hydroponic farms in Egypt, the total Egyptian hydroponics production amounts to less than 0.5% of the total lettuce production in Egypt.

	Farm 1		Farm 2	
year	production (tonnes)	sales (x1000 EGP)	production (tonnes)	sales (x1000 EGP)
2013	13	220	73	705
2014	17	670	73	900
2015	27	2,200	146	1,380
2016	54	4,400	292	2,400

Table 3.1: Production and sales of hydroponic products (2013/2014 realized; 2015/2016 projected) based on interviews with Egyptian hydroponics farmers.

As for delivery to their clients at least one of the farms delivers twice per week and takes all orders up to 24 hours before delivery. The sold produce is harvested on the same day as it is delivered.

3.2 Major production constraints

Introducing a new production technology usually comes with various teething troubles, which is also the case with hydroponics in Egypt. This hampers the start-up of new business opportunities. Below is a summary of the most important constraints for hydroponics in Egypt.

Skilled labour: Finding skilled labour is a major constraint among the interviewed farms. This field is new and there is not enough skilled labour to assist in the production and operation. Finding, training and keeping human resources is currently a constraint. Investing time and resources in training new employees and building their capacity is costly and time consuming with high probability of errors. Unfortunately growing crops in hydroponics is a very sensitive and an unforgiving operation, so single errors due to missing information can have significant impacts on the production. Also, expertise on biological pest control is lacking in Egypt, as one grower put it, and it is difficult to find the right expertise to combat pests without using chemical pesticides in hydroponic systems. Therefore, capacity building and access to proper training is extremely necessary to minimize the risk caused by unskilled labour. eLearning opportunities could possible make trainings more accessible for local labour.

Financial resources: Convincing investors to invest in this new technology is a challenge. Limited knowledge on hydroponics production under Egyptian conditions is available and farmers work with trial and error to tune their operations, which comes at a high financial cost. This situation has significant negative impacts on the attractiveness for potential investors.

Land ownership: Land ownership is a major constraint for farmers as receiving permits for land use takes a long time, is a tedious process and in itself often a cause of delay for projects to start. Water quality is a major factor in choosing the location for the project. Water must be of very good quality in terms of salinity levels in order to be able to be used in this type of systems, as one of the farms pointed out. A proper water analysis is crucial for the success of the project.

Production supplies: Most farms complain about the unavailability of hydroponic supplies such as special pumps, tubes, gutters, pots and other hydroponic specific supplies. Since theses supplies are not available they tend to resort to other solutions that are less efficient than the

proper equipment for hydroponic production. This has implications on the yield and on control of the crops. The absence of supplies is not surprising since only five to ten hydroponic farms exist all over Egypt as pointed out earlier.

Climate: One of the major production constraints is the summer heat. Most leafy greens, with the exception of basil, prefer the cooler temperatures of the Egyptian winter, thus major losses in quantity and quality occur during the summer months July to September. Using special reflective sheet covers for the greenhouses is one way of reducing temperatures, however these sheets are not readily available locally and it is difficult to import them in small volumes. Misting with water is another way of fighting the high temperatures but this also leads to the risk of higher humidity which can serve as a medium for diseases to grow inside the greenhouse and destroy the plants.

Produce variety: Another cross cutting challenge is, although not restricted to hydroponics, the access to new varieties in Egypt. Currently, seeds are sourced from Europe or the US through local dealers and traders. The Egyptian seed law has many constraints which hinder the process of introducing new varieties being produced globally. This is a major challenge and changing some of the current regulations is the only solution to it.

Automation: Automation systems work well in hydroponic systems. However, a certain farm size is needed in order for them to be economically viable. Access to automation systems for hydroponic production in Egypt is almost non-existent. Farms mainly depend on manual labour, which comes at a higher cost than the automated systems if taken possible errors of unskilled labour in account.

This overview of the main production constraints hydroponics farms are currently facing shows that constraints are mainly the consequence of three factors, namely the small scale hydroponic production, the limited experience with these production systems and current regulation and laws.

4 Hydroponics market

4.1 Consumption

The demand for hydroponic products is currently small, partly because of the small production but also because the technology is not well-known. Also, hydroponic farms currently produce a limited number and volume of agricultural products, namely various types of lettuce, herbs and kales, which are selected as innovative products (new greens) for the Egyptian market. Some general information regarding the Egyptian food market is presented in the following paragraphs in order to put the hydroponics production into perspective.

In 2009 in Egypt an average of 38% of consumer expenditure was related to food and drinks. The corresponding volume is around 420 kg per head and with an amount of 200 kg vegetables is by far the most important category ([7]).

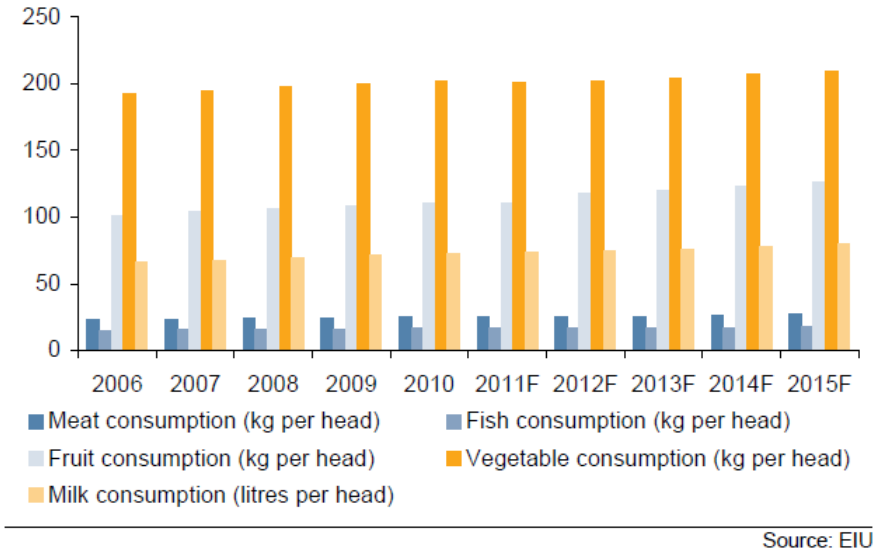


Figure 4: Food consumption in Egypt per category (source [7]).

Another source [3] claims a share of 50% food expenditure in the rural sector and 40% for urban consumers in 2009/2010.

The average annual food expenditure of the urban consumer equals 1,821 EGP (c. 200 EUR), whereof 234 EGP (c. 26 EUR) is spent on vegetables (Table 4.1). This amount combined with the annual consumption of 200 kg of vegetables as mentioned above indicates an average price of 1,17 EGP/kg paid by an urban consumer for vegetables. Hydroponic products are more expensive with selling prices on average between 30 and 80 EGP/kg for leafy products (30 EGP per kg of lettuce, 80 EGP per kg for baby leaf salad). For example, a head of hydroponic lettuce is sold for 10 EGP in the upper class districts in Cairo compared to 1 or 2 EGP for regular lettuce. Herbs tend to be on the higher side of the price range (70 to 80 EGP/kg) as well.

Expenditure (EGP)	2009/2010	
Food category	Value	%
Cereals	241.20	13.25
Meat	484.97	26.64
Fish	131.02	7.20
Milk – Eggs	269.46	14.80
Fruits	128.64	7.07
Oils – Fats	151.38	8.31
Vegetables	233.87	12.84
Sugar	80.69	4.43
Other food products	35.78	1.96
Beverages	63.75	3.50
Total food expenditure	1,820.65	100.00

Table 4.1: Average annual per capita expenditure (EGP) on different food groups in urban Egypt 20009/2010 (source [3]).

4.2 Market strategy

Hydroponic farmers produce so-called new greens, vegetables that are relatively unknown to the Egyptian market. This market strategy on the one hand reduces competition since there is no regular alternative and on the other hand extends the assortment of high end outlets and exclusive hotels. The hydroponic farmers put significant effort into the introduction of new products that the customers and chefs are not accustomed to using. This strategy took growers a lot of time and effort to work through the learning process.

Hydroponic production in itself is not a selling point to consumers, since it solves a production issue rather than a consumer need. The consumer need, and thus the selling points, rather relates to the results from the hydroponic products, namely tasty, qualitatively high and safe products. Hence from a marketing point of view these products are comparable to regular organic products as they are often also produced in an organic manner and as they target a comparable consumer group, namely consumers caring about the quality and the safeness of their food and having the means to pay higher prices for this. According to interviews, upper class consumers in Cairo are willing to pay premium price for high quality and food safety. Generally, the hydroponics products are well packed and boxed and presented in an attractive way, which boosts the consumer confidence in the product.

4.3 Current market

Since production volumes are very small, there is not much flexibility in the system leading to restrictions in consistency and regularity of supply and quality. From this point of view hydroponic farmers prefer high-end retail stores rather than large-scale hotels. The hydroponic farms cater 50 to 70% of their products to upper-class consumers be it hotels and restaurants or retail outlets. Middle to upper-class represent 20 to 30% of the market. Retail amounts to between 30 and 40% of the sales while upper-class hotels to over 60%. Negligible amounts are found in the wholesale market, and one farm reported selling an estimated 30% of production

directly to consumers. Each farm works with two to four retailers and two of the interviewed farms also supply a limited number of hotels and restaurants (four to five) located in upper-class areas. None of the farms export to date. According to the interviewed producers currently demand is exceeding the supply.

4.4 Potential markets

In addition to wholesale markets, distribution channels for food generally are [8]

- hypermarkets, supermarkets;
- large grocery stores;
- medium and small grocery stores;
- hotels and restaurants.

For hydroponic products, target markets are domestic urban areas where consumers (are able to) buy higher value-added products. For this project three urban areas are investigated and discussed in the next sections.

4.4.1 Cairo

Cairo is the capital of Egypt with a population of about 20 million people in the metropolitan area [9]. The hydroponic farms interviewed for this project are all located in Cairo and serve a few retailers and hotels in this city (see paragraph 4.3). Obviously, the demand for hydroponic products is larger than the supply because of the significant number of potential urban consumers. The latest 2011 official Income and Expenditure Survey shows that 2.1% of the urban population of Egypt (c. 785,000 persons) have annual incomes exceeding 100,000 EGP. Considering this percentage for Cairo and Alexandria only, the population having the purchasing power to afford hydroponic food products amounts to about 285,000 persons. With a conservative assumption of 25% of them interested in purchasing high quality and in particular safe products the potential market amounts to c. 70,000 household consumers in Cairo and Alexandria alone. Hotels, restaurants and other similar institutions add to this amount.

In 2009, Cairo had 580 supermarkets, 10 hypermarkets and 430 convenience stores [8], all potential outlets for hydroponic products. For Cairo the short-term market growth is mainly depending on availability and reliability of the product supply. Besides the retail market high-end consumers can be found in the tourism sector, i.e. hotels and restaurants. Egypt had 1240 hotels in 2012 [10], of which Cairo is assumed to have a significant share[4], and if they use hydroponics products they require large amounts of them. Cairo hotels are mostly business hotels that cater to a wide range of clientele including Arab and Western European guests. High-end hotels in Cairo almost all operate on bed and breakfast only basis with a high-end restaurant integrated into their facilities. These hotel restaurants can offer a high-end product and sell it at a corresponding price.

[4] No reference found on the number of hotels in Cairo.

They are not constrained by all-inclusive packages and the corresponding implication of cost reduction for food items as are their counterparts in tourist areas (see paragraph 4.4.2).

Currently, the hydroponic production is too low to match the regular demand some hotels need to do business with them. The hotels acknowledge the idea of hydroponics production and are willing to use the product despite the higher price as it enables them to offer a premium product. Hotels that bought hydroponic products got their product directly from specialized hydroponic producers, while other conventionally grown crops are mainly being supplied through contracted suppliers who in turn obtain the produce from wholesale markets in Cairo. Hotels usually work with one to three suppliers depending on the hotel size. Price, consistent quality, regularity of supply, freshness and food safety are the major criteria on which procurement managers rate their fresh produce suppliers.

Three hotels in Cairo were interviewed (Radisson Blu (427 rooms), Semiramis Intercontinental (730) and Sofitel (480)) reporting the following data on their leafy vegetables:

- Purchased (main): regular lettuce (Iceberg, local, Arabic, French), arugula, red leaf
- Volume purchased per day: 75-100 kg
- Shelf life : 1-2 days
- Prices vary between 3 and 6 EGP/kg; only French lettuce was 10 EGP/kg

As mentioned in section 4.1 the price of hydroponic leafy vegetables is between 30 and 80 EGP/kg, which is significantly higher than the currently paid prices. Furthermore, the annual demand of a hotel based on the figures as mentioned above shows the small scale of current production (Table 4.2).

Daily demand	Annual demand	Current total production
75kg	27,375 tons	450 - 900 tons

Table 4.2: Comparison average annual demand of leafy vegetables of a hotel vs. current production volumes in hydroponic agriculture.

At the same time this comparison also shows that even if only very few hotels decide for hydroponics products there is a significant market potential.

Besides the hotels two Cairo retail branches of BioShop were interviewed. They sell organic leafy vegetables (lettuce, arugula and parsley) for 3.5 EGP per sachet[5]. BioShop believes that there is a potential for hydroponics, however marketing is needed to convince the consumer of the added value. In general typical leafy vegetables sold by retail in Egypt are lollo rosso, Iceberg, mixed greens, baby leaf, romaine, Batavia, mesclun, oak leaf, and local varieties, and margins are between 50 and 100%.

[5] The weight of a sachet is unknown and hence no direct comparison is possible between these products and hydroponic products.

4.4.2 Hurghada, El Gouna and Sharm el-Sheikh

The possible target market in Hurghada, El Gouna and Sharm el-Sheikh are touristic resorts and hotels. They mostly cater for leisure tourists and almost always offer all-inclusive packages exclusively covering travel cost, accommodation, meals and beverages. These come at extremely competitive prices. Compared to their Cairo counterparts with a business focus, all-inclusive resorts focus on getting produce as cheap as possible. Nevertheless produce quality as well as availability and consistent quality is important to these hotels. In the winter the quality of leafy vegetables is much better than in the summer. Also some hotels position themselves with a healthy or environmental friendly profile, which could be a reason to decide for organic or hydroponic products. In difficult times, however, a premium product like hydroponic lettuce or similar is not of *prime* importance.

Generally, the use of hydroponic and organic produce is markedly low. None of the interviewed hotels in Hurghada, El Gouna and Sharm el-Sheikh reported any use of organic or hydroponic products. Product prices are higher than in Cairo and the location of the hotel is a major determinant of the regularity of supply and the cost of the products. Coastal resorts not only have to incur the transportation costs over a longer distance than their Cairo counterparts, their suppliers also need to use cold trucks in transporting the hotel supplies. This is not the case for Cairo hotels whose proximity to wholesale markets in El Obour or 6th of October results in lower transportation costs and allows for more frequent supplies. Most hotels have a delivery frequency of every 2 or 3 days and order between 30 and 135 kg of leafy vegetables per delivery, i.e. 60 to 400 kg per week. The price for regular iceberg lettuce was reported to be 5 EGP/piece.

Figure 5: Resort Steigenberger in El Gouna (source: http://steigenbergergolfelgouna.com/dining#prettyPhoto).

Some constraints for the use of hydroponic products in Hurghada, El Gouna and Sharm el-Sheikh, e.g. the high price, could be solved by producing locally. Especially for Sharm el-Sheikh the logistics costs are a significant share of the cost price and could be reduced significantly. If production is done in a controlled environment, issues like constant quality and availability of the produce could be solved as well. The trade-off is the fact that an additional supplier would be created for only a small assortment.

5 Conclusion and recommendations

In the preceding chapters the current production and production constraints were assessed and the demand side of hydroponics described taking current demand and potential future markets into account.

It became evident that for tourist areas such as Hurghada, El Gouna and Sharm el-Sheikh the high price of hydroponics production leads to reductions in the hotels' margin as they mainly offer all-inclusive packages. The end consumer, the tourist, does not pay for the premium product. Consequently, hydroponics products are only interesting if they fit perfectly into the proposition of a hotel or resort, e.g. having a strong image regarding environmental sustainability or health aspects. In other words the potential market can be assessed as rather limited and difficult to access.

In Cairo this situation is different as meals are usually not included in a hotel price and guests eat a la carte in the hotel's restaurant. With good marketing hydroponics products can be offered here with a corresponding price of the meal as the higher cost is directly covered by the consumer. An important issue though is the high volume and the regular supply and consistent quality that are demanded by hotels. Without finding solutions to these issues this market potential will not be turned into concrete business opportunities. Also from the point of view of the existing hydroponics farms, Cairo is a more interesting market as the logistics costs are lower and the lead times shorter. Longer lead times reduce the shelf life and hence increase losses.

Regarding retail as a potential market channel, it became clear that the costs for hydroponic products are significantly higher than for regular products. Currently, hydroponics products are only available for the high-end retail market. However, reduction in production cost due to better equipment, reduced losses and higher productivity could increase the market potential in the retail market. Regarding the current production volumes retail is a more interesting market channel than hotels due to the demanded volumes and expectations in terms of regular supply and consistent quality as mentioned above.

Local hydroponics production close to the resorts could be an interesting option if stability in availability and quality of the product can be realized. Possibly, the production site could even be marketed as an additional attraction for tourists if it is set up with some educational elements, maybe even including the wider context such as the mentioned water issues. Another consequence is the fact that an extra supplier of food produce is then created for the hotels. Considered that they are situated far from the wholesale markets in Cairo they have a strong preference for one or very few suppliers for the entirety of their needs. Having an additional supplier can thus be considered into a negative consequence.

As a summary we can state that there is market potential for hydroponics products in Egypt in specific market segments. However, significant issues in the production affecting costs and consistent supply and quality have to be overcome in order for the hydroponics produce to become an accepted produce in the market.

The hydroponics sector is still very small scale though upcoming in Egypt. The existing farmers face a number a production constraints and the market is not yet fully ready for the hydroponics products. This offers opportunities for interventions to support this sector, for instance:

- Technical capacity building for growers and their employees (e.g. trainings)
- Knowledge exchange between Dutch and Egyptian parties (e.g. missions/ field trips, round tables)
- Common production standards and certifications
- Set up of growers' associations, cooperatives or the like for hydroponics farmers to profit from a bundling of forces

References

1. (UNFPA), U.N.P.F., *state of world population 2007, Unleashing the Potential of Urban Growth*. 2007: p. 108.
2. IFPRI, *High Food Prices: The What, Who, and How of Proposed Policy Actions*. May 2008: p. 12.
3. Dawoud, S.D.Z., *Econometric analysis of the changes in food consumption expenditure patterns in Egypt*. 2013: p. 11.
4. Willie van den Broek, H.B., *Metropolitan food supply: Case Study Cairo - A quick scan study to enhance fresh food supply and minimize post-harvest losses*. 2014: p. 27.
5. Willie van den Broek, H.B., Nina Waldhauer, *Metropolitan food supply: Commitment mission Egypt, rapport 1511*. 2014: p. 13.
6. Ecorys, *Trade Sustainability Impact Assessment in support of negotiations of a DCFTA between the EU and Egypt*. 2014: p. 140.
7. Zayed, H., *MENA strategy (Middle East & North Africa)*. 2012: p. 26.
8. Julio Maldonado, S.M., *Egypt - Retail Foods - Retail Food Sector*. 2010: p. 15.
9. Wikipedia, *Cairo* 2011: p. 1.
10. International, C., *EGYPT HOSPITALITY MARKET OVERVIEW with a Focus on Cairo*. 2013: p. 11.

Appendix A Production and trade data vegetables in Egypt

Product name	production (tonnes) 2011	%
Tomatoes	8,105,263	43%
Onions, dry	2,304,207	12%
Watermelons	1,508,941	8%
Eggplants (aubergines)	1,166,430	6%
Melons, other (inc. cantaloupes)	1,038,412	5%
Chillies and peppers, green	670,434	4%
Cucumbers and gherkins	665,070	4%
Pumpkins, squash and gourds	633,557	3%
Cabbages and other brassicas	626,011	3%
Vegetables, fresh nes	605,000	3%
Beans, green	305,561	2%
Garlic	295,845	2%
Peas, green	225,689	1%
Artichokes	202,458	1%
Cauliflowers and broccoli	201,201	1%
Carrots and turnips	150,339	1%
Lettuce and chicory	94,344	0.5%
Okra	84,041	0.4%
Vegetables, leguminous nes	79,940	0.4%
Spinach	28,767	0.2%
String beans	300	0.0%
Total	**18,991,810**	**100%**

Table A.0.1: Production of vegetables in Egypt in 2011 (source: FAOSTAT).

Lettuce and chicory trade (tonnes)		
Year	Import	Export
2007	0	7003
2008	7	6802
2009	31	10432
2010	2	6209
2011	8	14261

Table A.0.2: Import and export Egypt of lettuce and chicory (source: FAOSTAT).

