

4

CONCEPTUAL APPROACH

decentralise. localise. empower.

enabling communities through local and sustainable
socio-economic systems

In order to place focus on immediate communities and bring about more opportunities food systems need to be centralised and released from a single point of control. By breaking down one large system into multiple small systems that are sustained within their immediate context more economic prospects become available for locals. Instead of relying on exports and systems that are very centralised, each community should be involved with a smaller decentralised model that enables the community as a whole and promotes holistic thinking.

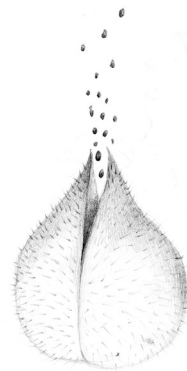


Figure 89 : Conceptual sketches (Author 2016)

DECENTRALISE

The aim is to enable local points of urban acupuncture that encourage communities to get involved with urban agriculture and realise the value in locally grown crops and products. Easier access to food allows for a more food secure environment. Through local production and increase of job opportunities money is able to stay within the community and in turn aids in the advancement of local resources.

LOCALISE

In order to activate points of acupuncture reliance must fall on more systematic thinking and creating an environment through which everything is integrative on an immediate scale. Thus limiting the waste of resources and encouraging a holistic approach (Capra & Luigi Luisi) allowing for communities to prosper without needing external assistance or reliance on larger networks.

EMPOWER

To effectively enable the immediate community a space and system needs to be created that brings together and empowers society as well as individuals and local initiatives through local support and increased economic opportunity. By allowing individuals to gain confidence in their urban environment future prospects encourage socio-economic growth.

the moshav

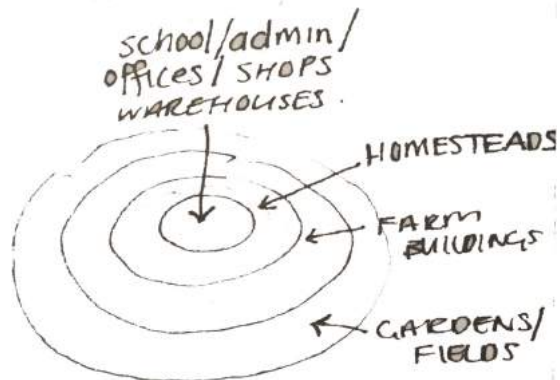


Figure 90 :The Moshav conceptual layout (Author 2016)

The concept of the Moshav, a cooperative Workers' Settlement, developed in 1919 and was formulated that year in a publication by E. L. Yaffe. In 1921, Yaffe and the young women and men who shared his visions, began to initiate a new type of agricultural settlement. It was thought that the kibbutz, everything is communal and shared, was limiting in terms of personal initiative and a sense of achievement due to the social structure thereof. Thus, Yaffe and his team were inspired to create a new type of farmer that belonged to a socially just society as a foundation for a free nation (Israel Philatelic Federation 2016).

The aim was to establish a society that built on the family as the fundamental unit, in which each family unit would have the same opportunities within a structure of social guidelines based on the following four principles:

- national land
- self-labor
- mutual assistance
- co-operative marketing and buying.



Figure 91 :The Moshav urban layout (amusingplanet.com)

Unlike the kibbutz, within the moshav you provide for your family first and excess goes to the community.

urban farming revolution cuba havana

Cuba was cut off from trade with the Soviet Bloc in 1989 due to the collapse of the Soviet Union. Cuba was reliant on the Soviet Union for chemical imports for fertilisers and pesticides. Owing to the drop in oil availability, limiting farming machinery use, the small island struggled to produce and export sugar and citrus fruits in order to gain critical imports such as corn, cereals and meat that had become the Cuban staple diet (Clouse 2014). The result was an economic crisis that quickly led to a food crisis. Residents lost up to 1/3 of their daily calories.

In response, the Cuban government promoted urban agriculture at various scales, which initiated the beginning of Cuba's Green Revolution System of Agriculture (McKibben 2005:62). The idea behind the revolution was to provide local, affordable and accessible foodshed (like a watershed that feeds water into a specific area, a foodshed is a geographic region that produces the food that a particular population depends upon) that includes organic farming methods, production of useful edible crops and peasant labour (Clouse 2014).

The systematic approach meant that all landscapes had to be rethought out to ensure maximum productivity. Food production infrastructure has since been woven into the existing urban fabric, ranging from backyards to large peri-urban farms, in order to introduce food production into the city (Clouse 2014).

The Cuban government also supports the urban growing efforts through other programmes such as training and support, hosting subsidised agricultural stores, pesticide labs and compost sites. This top-down state support and ground-up citizen participation has led to over 35000ha of land being effectively used for urban agriculture (Koont 2009:1).

conclusion

Cuba's Green Revolution stands out as one of the most successful examples of urban agriculture in the world. The urban farming incorporates grassroots organising, shared educational and technical support and the appropriation of public space to be utilised for growing. Cuba's model is affordable, comprehensive, accessible and organic and should thus be implemented in other areas to help combat food insecurity (Clouse 2014).

In order to decentralise, localise and empower, members within the community need to be able to provide for themselves and satisfy their needs to be able to contribute to the overall growth of society. The moshav initiates the concept of developing personal initiative and thus is a good basis from which to theoretically initiate this dissertation from a conceptual point.



Figure 92 : Cuba Havana urban agriculture initiatives (Clouse 2014).

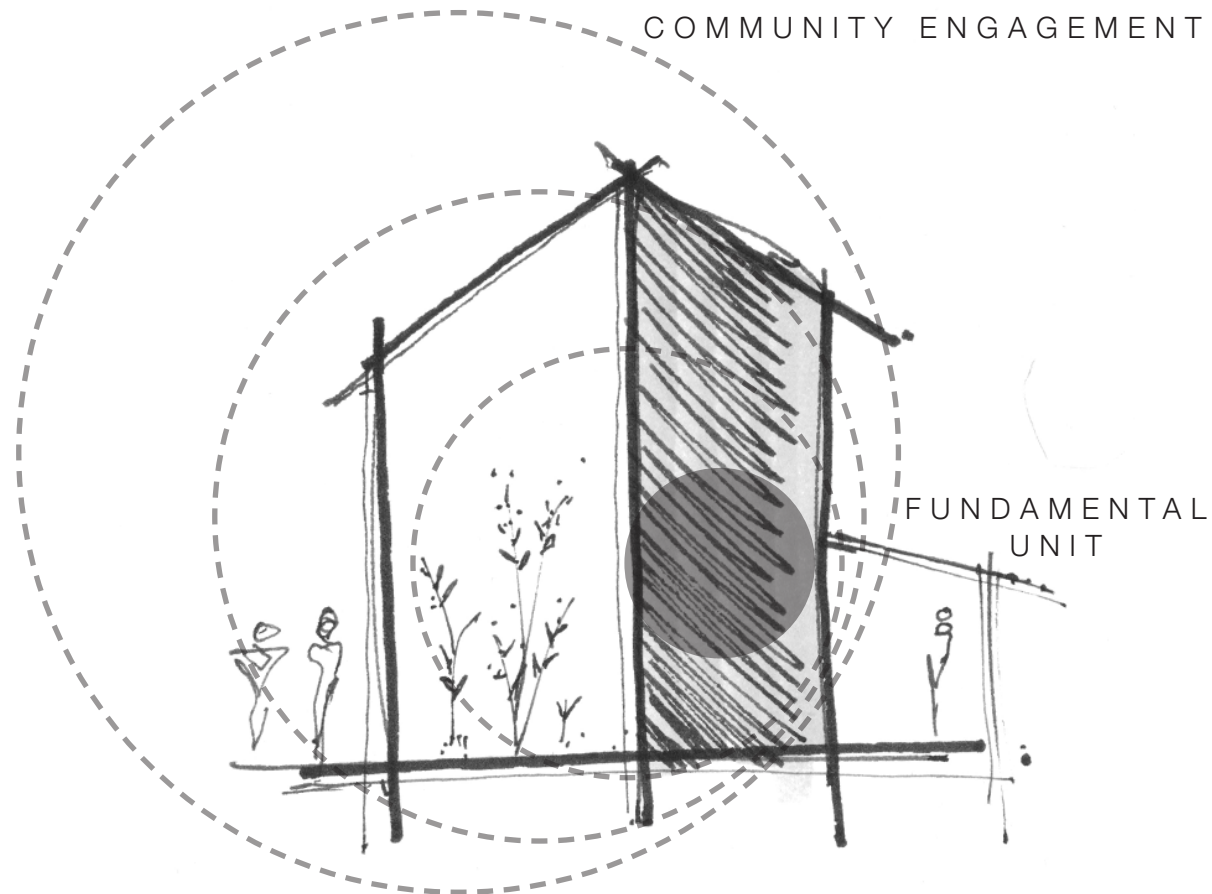


Figure 93 : Cuba Havana urban agriculture initiatives (Clouse 2014).



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Figure 94 : Conceptual collage_community orientated food production (Author 2016)



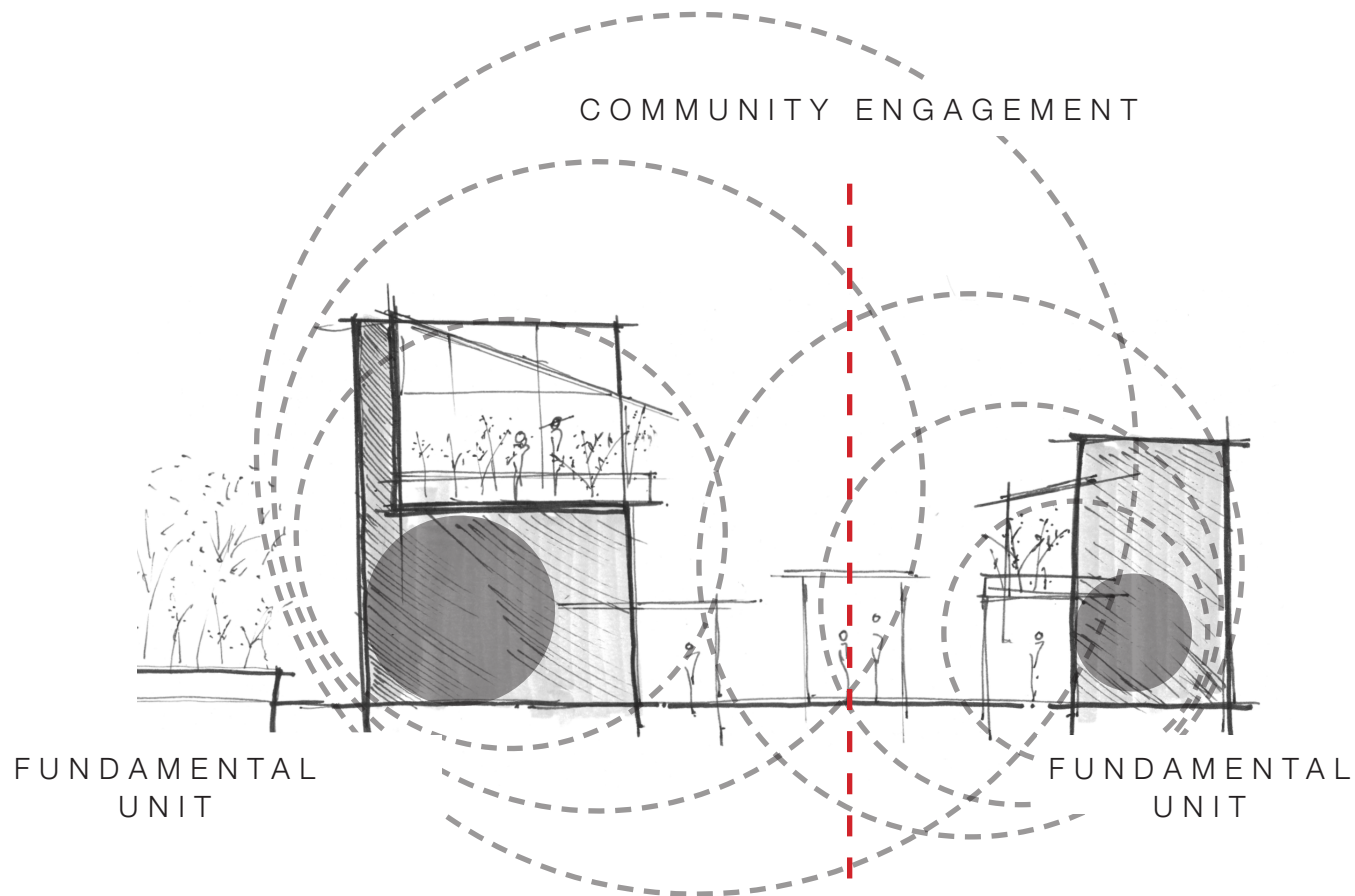
The conceptual collage of the greenhouse (figure...) was created with the concept of the Moshav in mind. The idea is to create a structure that encompasses a variety of functions that are sustainable within a community.

The residential unit sits within the greenhouse structure and forms the fundamental unit from which everything radiates. Production is the responsibility of the residents but is not limited to them. Communal participation is encouraged which aims to revive social interactions and create a sense of local support. Residents take only what is needed and the excess is provided to the community.

Figure 95 : Conceptual diagram_community orientated food production based on the Moshav (Author 2016)



77. Figure 96 : Conceptual collage_community orientated food retail and trading opportunities (Author 2016)



With more of an influence from Cuba Havana, the conceptual collage (figure...) focuses more on the integration of food production into the existing urban fabric.

Due to lack of open ground for agricultural means, the use of vertical infrastructure becomes very effective. The utilisation of balconies for food growth is a valuable use of space and also allows for ownership over the production.

Individuals would be encouraged to sell excess fruit and vegetables within the local community, thus following a similar concept of the Moshav. This enables local and affordable access to food as well as a successful integration of the urban environment.

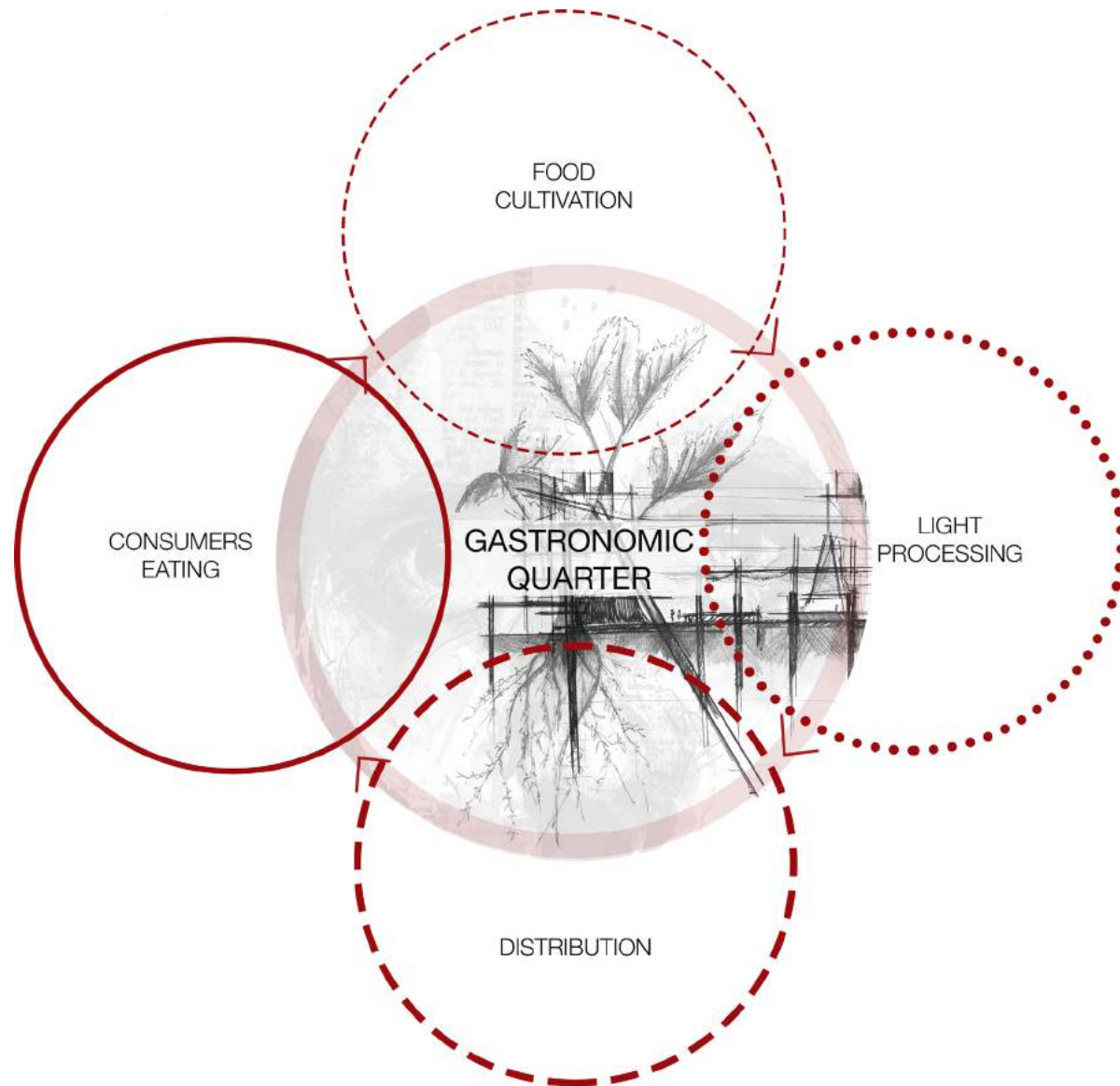
Figure 97 : Conceptual diagram_community orientated food production based on the principles of Cuba Havana (Author 2016)

PROGRAMME

a gastronomic quarter

The primary cause of food insecurity, amid the urban populations, is not production but accessibility. In urban regions, accessibility is based on the individual or collective household's ability to afford food, which in turn centers on the income of the household, the location of food outlets and the price of the food (Crush & Frayne 2011). Spatial implications of the food system and the various processes that make it up have resulted in social, economic and environmental implications that add to the decrease of accessibility and thus have had large consequences with regard to food security and the decline thereof.

Building a city up and not out allows for shorter travel distances, easier access to public transport, discourages single car ownership and occupancy. Denser cities are easier to service as moving and storing food in and around a tightly packed city is cheaper than doing so in a wide, sprawling one and so it should aid in the lowering of food prices. A family that lives closer to key nodes such as transport, shops, schools and the job market will have more expendable income which allows for a better quality of life (Joubert 2012:184).



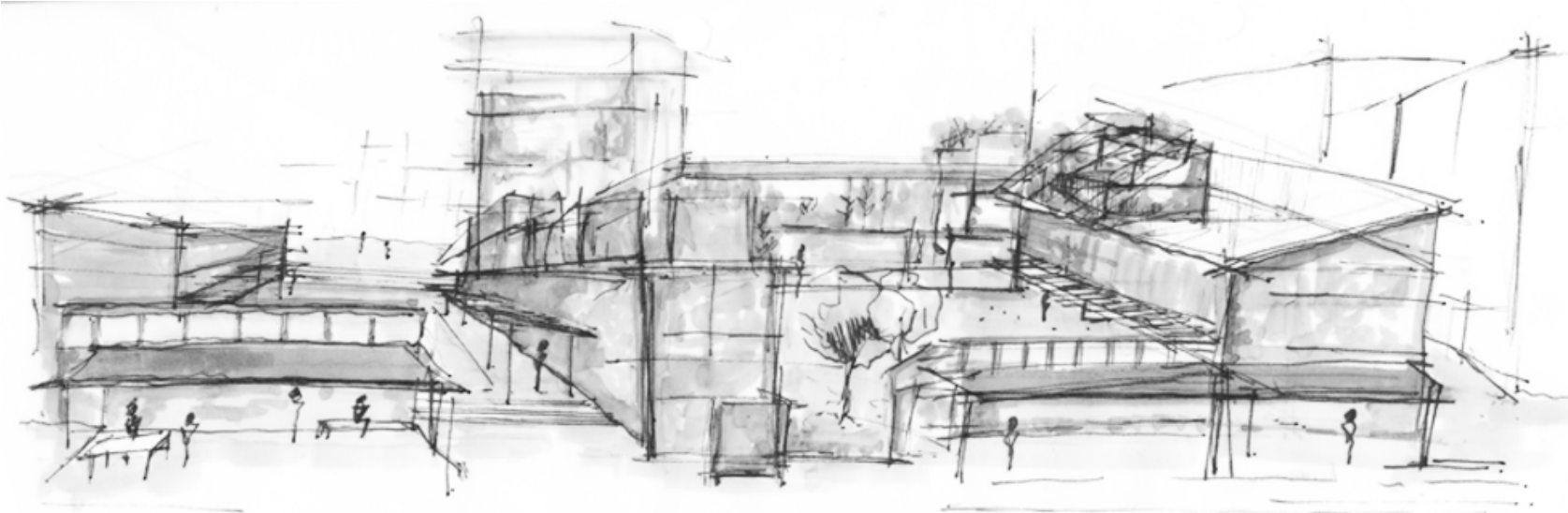


Figure 98 : Conceptual design sketch (Author 2016)

main programme

The programme aims to reconnect the site to the surrounding area through a food centred environment, otherwise known as a gastronomic quarter. A successful gastronomic quarter consists of a series of well-configured outdoor spaces that demonstrate an appropriate level of enclosure (Parham 2005:91). These spaces act as positive and vital connections to the urban fabric through the use of edges and change in scene.

The conditions of a successful gastronomic quarter relate back to the historical and traditional conditioning of cities whereby food environments demonstrated a strong marked sense of place that exhibited a healthy relationship between the form of the spaces and its various social, economic and environmental functions (Parham 2005:91).

In this instance the gastronomic quarter will aid in shortening the food chain, which will keep capital in local business and reduce middleman costs thus positively altering the economic viability of the area (Feagan 2007). Local economies thus benefit from the localised systems and allow for positive growth of new local businesses (Halweil 2002:35). The shortened food system allows for better food to be provided to the consumer as nutrients are retained and less produce is wasted via transport damage making the food more accessible in terms of costs.

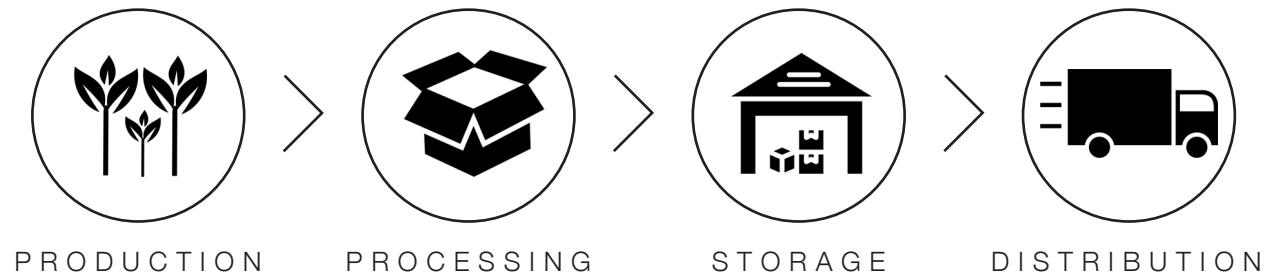
The localised space intends to include all systems and processes present in the food system in order to improve food security through the limitation of waste and the improvement of accessibility, thus aiding in transcending the socio-economic barrier present on site.

The food centred environment will bridge the large gap between the small scale and large scale distribution, a gap that needs to consider a pedestrian friendly interface that allows for much needed interaction on such an isolated site. Developments in trade can be seen as the catalyst for the regeneration of physically, socially and economically neglected areas that can contribute to new social networks (Kohler 2010). By limiting outsourced energy and localising resources, this site has the potential to improve food security and sovereignty through an architectural model that bridges the gap between formal and informal trade.

The entire food system network will take place within the designed gastronomic quarter and will have sub programmes that will support and enhance the food centred environment.

SUB-PROGRAMMES the food network

Sub programmes that support the food system and help create a healthy social environment include local businesses such as cafes, restaurants, outdoor retail spaces and cooking facilities that encourage interaction and socialisation.



current food production process

Growing the plants to be harvested.

Cleaning, sorting and packaging of fresh produce

Storage of produce for transport

Transportation of food from farm/processing plant to food service facility

proposed food production process

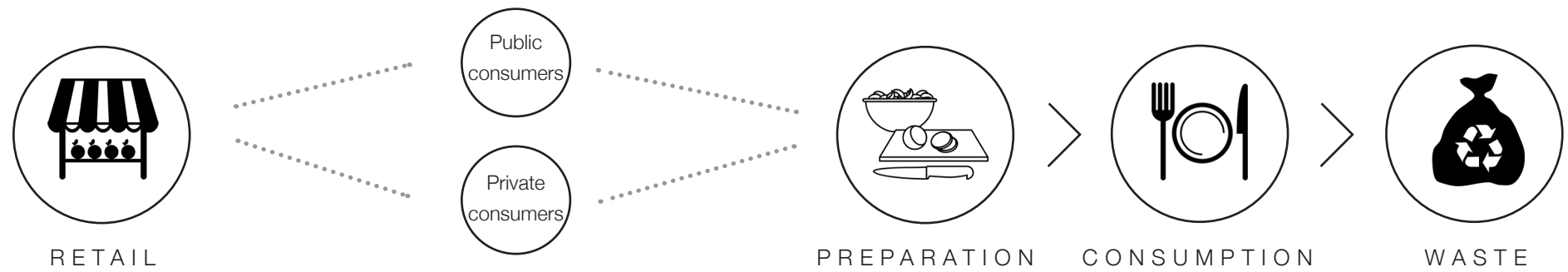
On site: Hydroponics greenhouse.

On site: no heavy or excessive packaging required.

On site: daily harvesting deems long term storage unnecessary.

On site: minimal food miles travelled. Option of daily fresh produce to be delivered via bicycle

Figure 99 : Food network system graphical representation (Author 2016)



current food production process

Restaurants, cafe's, juice bars & / Shops and markets

Public: Restaurant preparation
Private: home preparation

Public: restaurant consumer consumption.
Private: home consumption.

Public: management unique to system.
Private: trash

proposed food production process

On site: variety of restaurants, juice bars, cafes etc that use the fresh produce & / On site: daily fresh produce market.

On site: commercial food preparation exposed to consumers.

On site: singular outdoor eating area for all consumption.

On site: worm farm for leftovers and organic waste from public and private.

SUB-PROGRAMME

production



Due to the environmental conditions on site (previously mentioned in chapter 2 under Ecological Sensitivity) and the proposed urban vision of the site being vertically favourable to increase the density, an alternative to traditional means of land agriculture was researched and considered.

In order to ensure daily fresh produce, the basis of the gastronomic quarter, the food production system needs to run at optimal efficiency within the given conditions present.

Subsequent to site selection and analysis (page 82) there is insufficient horizontal space for agricultural plantations. The nature of the site also promotes vertical growth in order to increase density.

Thus, a greenhouse is the chosen method of production due to the opportunity they provide in optimising production within smaller areas and their ability to be built up vertically.

Within the context of South Africa there are multiple issues that can be resolved effectively through the utilisation of greenhouses in plant and food cultivation (figure 5). These include water conservation, soil conservation and energy conservation (Sydow 2010: 10), all of which are present within the context of the design proposal (site analysis p69-70).

SOUTH AFRICAN GREENHOUSE AND CROP PRODUCTION

ENERGY CONSERVATION

The climate conditions in South Africa are ideal for most crops and plants to be cultivated year round.

Ample natural sunlight makes supplemental lighting unnecessary for protected crops (Sydow 2010: 13).

Greenhouses within our context can take full advantage of solar light and radiation to maximize the crop yield without making use of additional energy sources.



SOIL CONSERVATION

Due to the need to build vertically, soilless media becomes an appropriate option to avoid the excessive loads that soil would place on the structure.

The prevention of soil borne diseases are creating an increasing demand for soilless media (Thomas 2012: 65).

Soilless media systems are thus important to consider within this context (to be discussed on page 91: hydroponics and aquaponics).



WATER CONSERVATION

Water conservation is considered the most important aspect of consideration due to the vast amounts of irrigation needed for crops (waste[d resources] p45) and the site falling on a watershed (site analysis p70).

Vertical agriculture limits ground water access, protected crops within a greenhouse are not exposed to rainfall (Sydow 2010: 11).

Soilless media and hydroponics growing systems are more effective within controlled environments, such as greenhouses, to achieve humidity and avoid water loss due to evaporation.



Figure 5: Diagram illustrating Relevance and Opportunities for using Greenhouses for Plant Cultivation. (Sydow 2010: 10).

gauteng agro-processing strategy

The Gauteng Agro-processing is a strategic intervention framework including recommended interventions to be undertaken in support of agro-processing development (Agriculture and Rural Development 2015:29).

The Gauteng Provincial Government, in the Gauteng Employment Growth and Development Strategy of 2009 set out a vision for the Province of *An inclusive and sustainable Gauteng City- Region that promotes a developmental and equitable society* (Agriculture and Rural Development 2015:29).

This vision is mirrored in the Gauteng City Region Economic Development Plan (2015), which envisages propelling the *Gauteng City Region into a seamlessly integrated, socially cohesive, economically inclusive region underpinned by a smart, innovation-driven, knowledge-based and green industrial and economic development* (Agriculture and Rural Development 2015:29).

In order to support the vision, steps have been taken to ensure an integrated city-region that characterised by social cohesion and economic inclusion.

The steps taken are done so through a programme of radical *Transformation, Modernisation and Reindustrialisation* of Gauteng (Agriculture and Rural Development 2015:29).

Economically, the transformation includes the creation of employment that centres around economic inclusion. This means that there is increased focus on bringing township enterprises and cooperatives into the mainstream economy (Agriculture and Rural Development 2015:29).

key challenges

Small-scale farmers, more often than not, have limited access to formal markets. This is a result of poor marketing infrastructure, inadequate access to market information and extension services as well as high transportation and transaction costs .

Many imbalances exist within the agro-processing industry. The sector is controlled by a few large players that own substantial proportions of the market share, with a number of small players who own insignificant proportion (Agriculture and Rural Development 2015:24).

South Africa is a net importer of processed agriculture, forestry and fisheries products, and an exporter of raw materials. These raw materials have the potential to be processed within South Africa for the local economy to benefit from the value addition. The processing thereof will lead to a direct decrease in the importation of processed goods.

agri-park guidelines

- One Agri-Park per District (44)
- Agri-parks must be farmer controlled.
- Agri-parks must be the catalyst around which rural industrialization will take place.
- Agri-parks must be supported by government (10 years) to ensure economic sustainability.
- Strengthen partnership between government and private sector stakeholders to ensure increased access to services (water, energy, transport) and production on the one hand, while developing existing and create new markets to strengthen and expand value-chains in-line with APAP.
- Maximise benefit to existing state land with agricultural

potential in the provinces, where possible.

- Maximise access to markets to all farmers, with a bias to emerging farmers and rural communities.
- Maximise the use of high value agricultural land (high production capability).
- Maximise use of existing agro-processing, bulk and logistics infrastructure, including having availability of water, energy and roads.
- Support growing-towns and revitalisation of rural towns, in terms of high economic growth, high population growth over past 10 years and promote rural urban linkages (Agriculture and Rural Development 2015:24).

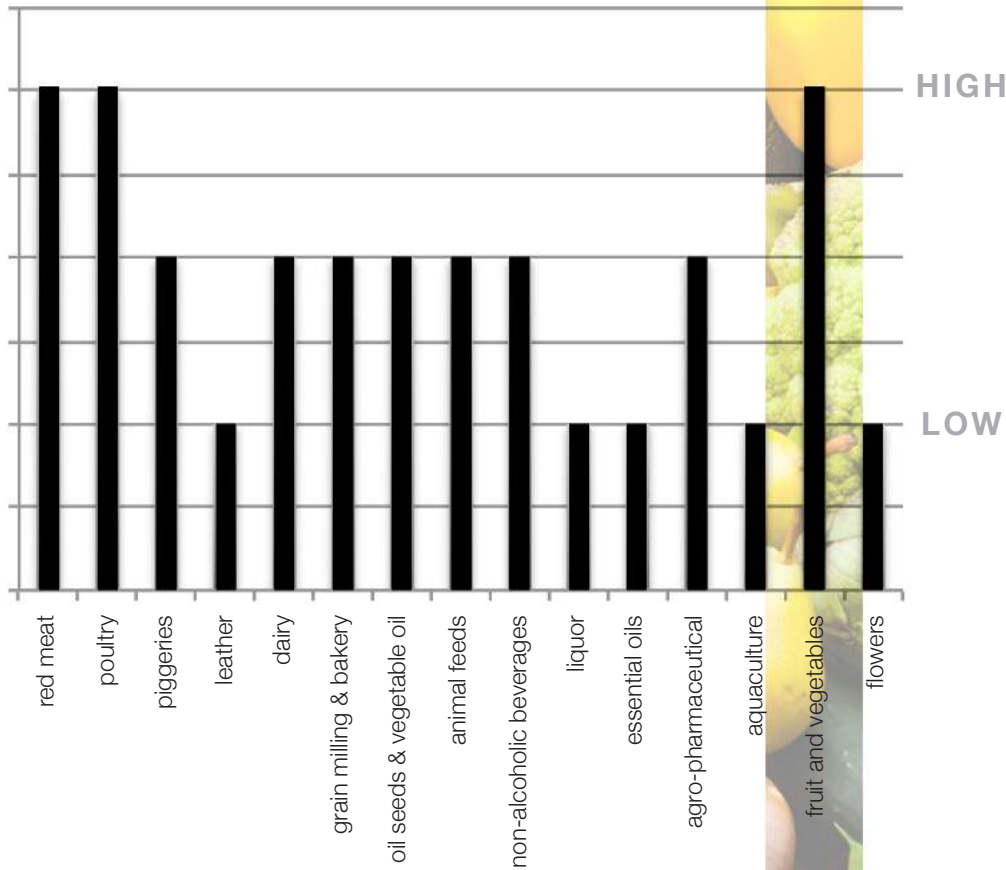
agri-park application

The implementation of the Gauteng Agro-Processing Strategy will improve market access and linkages as well as benefit the food system network as a whole, making it more accessible to a wider range of individuals. The strategy will aid in the promotion of social cohesion through the support of a mutually beneficial co-operation.

The strategy includes the implementation of Agri-parks, a networked innovation system of agro-production, processing, logistics, marketing, training and extension services, located in a District Municipality (Agriculture and Rural Development 2015:22).

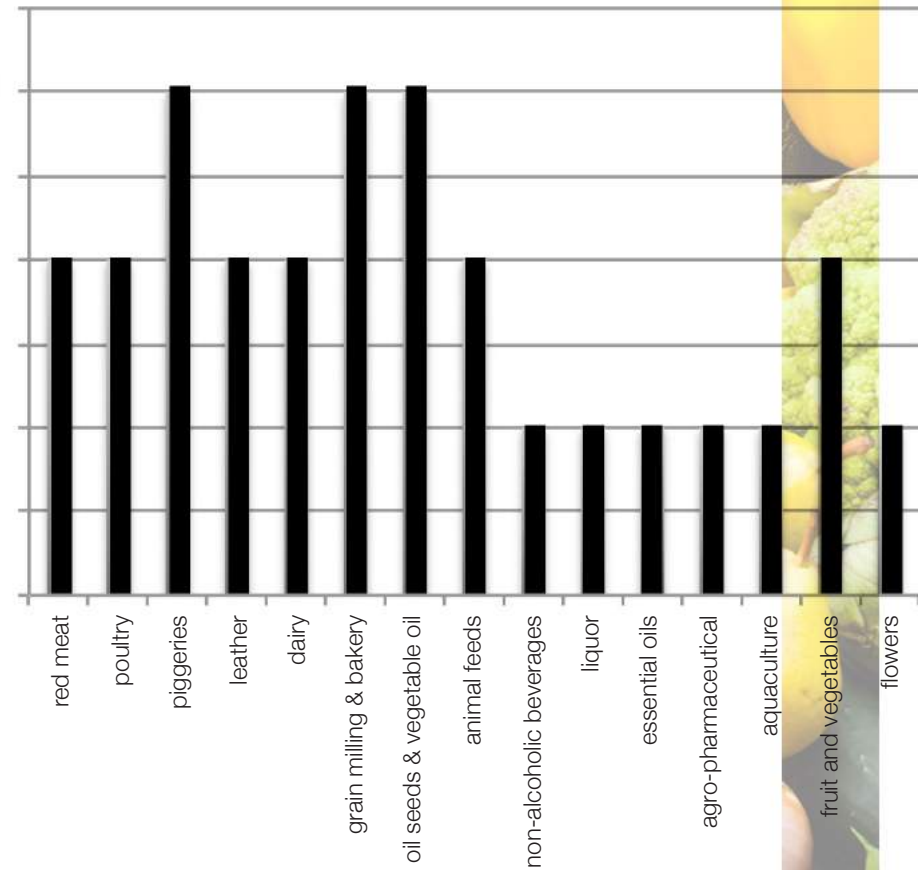
The Agro Processing Strategy and Agri-parks implementation provide a good argument for the development of a new agricultural approach that aims to assist in the economic inclusion of all individuals.

This is an effective premise to base the design proposal and its initiative to reconnect agriculture to the urban fabric.



strategic government priorities alignment rating

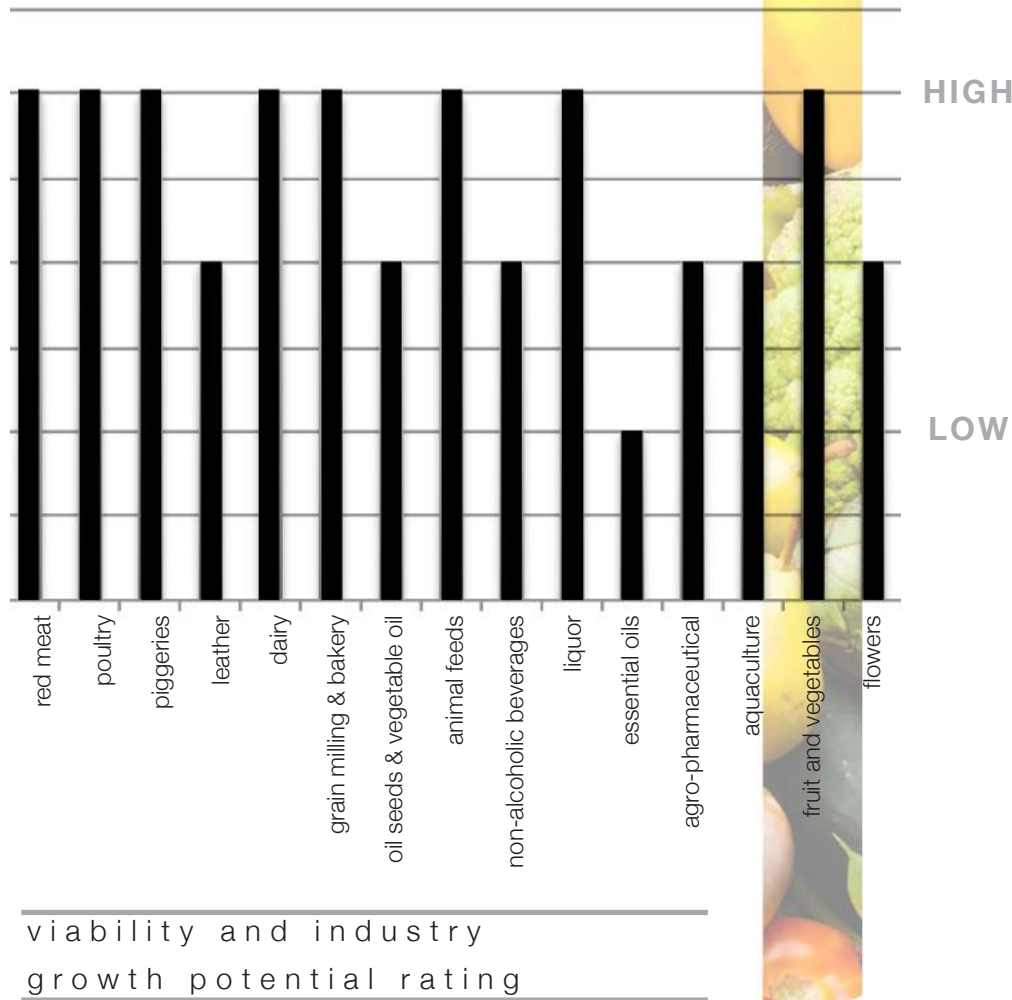
This table illustrates the scores of various industries in terms of aligning with government priorities. The results indicated that the red meat, poultry and the fruit and vegetables achieved the highest scores (Agriculture and Rural Development 2015:26).



local production base rating

The second evaluation was based on the criterion of the presence of a local production or an existing base within the Province, or a good source of inputs from outside the Province.

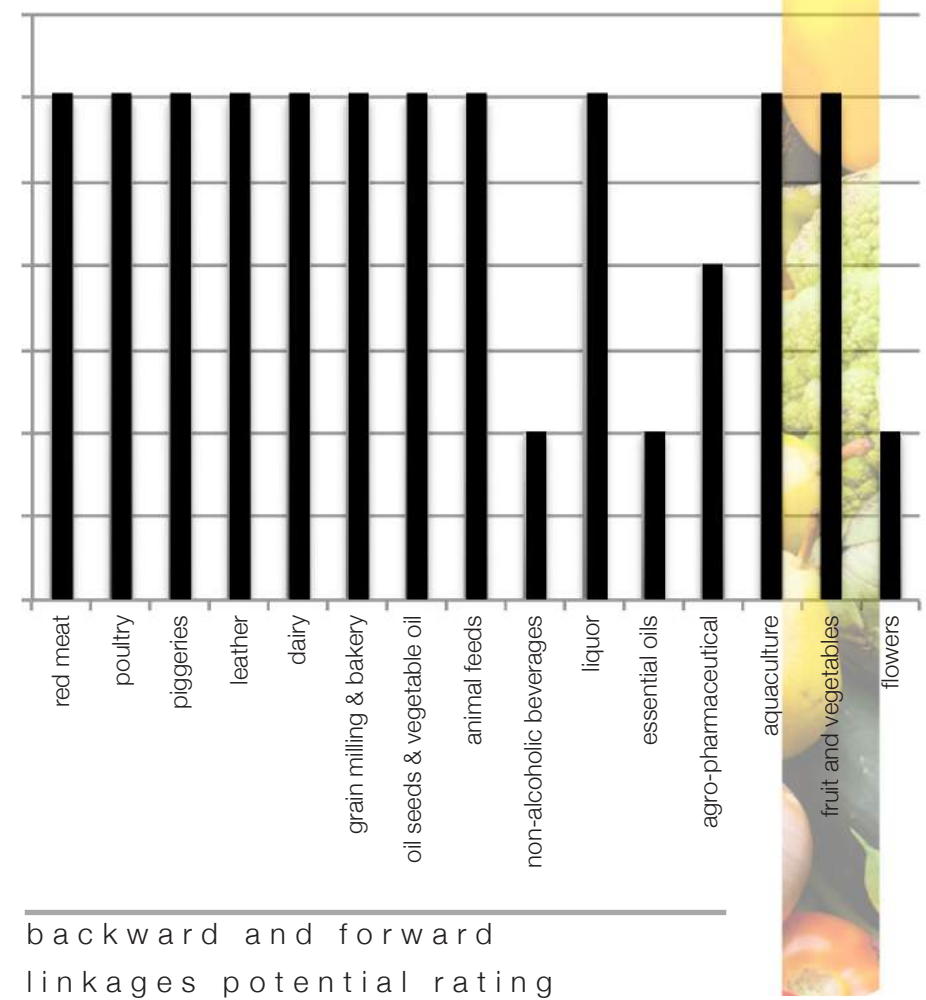
The presence of a local production base demonstrates easy access to primary products required as inputs and results in lower transport costs, thus contributing to the viability of the industry (Agriculture and Rural Development 2015:26).



viability and industry
growth potential rating

The third evaluation criterion was evaluated the viability and growth potential of each industry, based on the following considerations:

- Existing viability of the industry
- Potential for growth and expansion of the industry
- Growing demand for the product
- Existence of an unsaturated market space
- Potential for exports
- Presence of current development initiatives (Agriculture and Rural Development 2015:27).

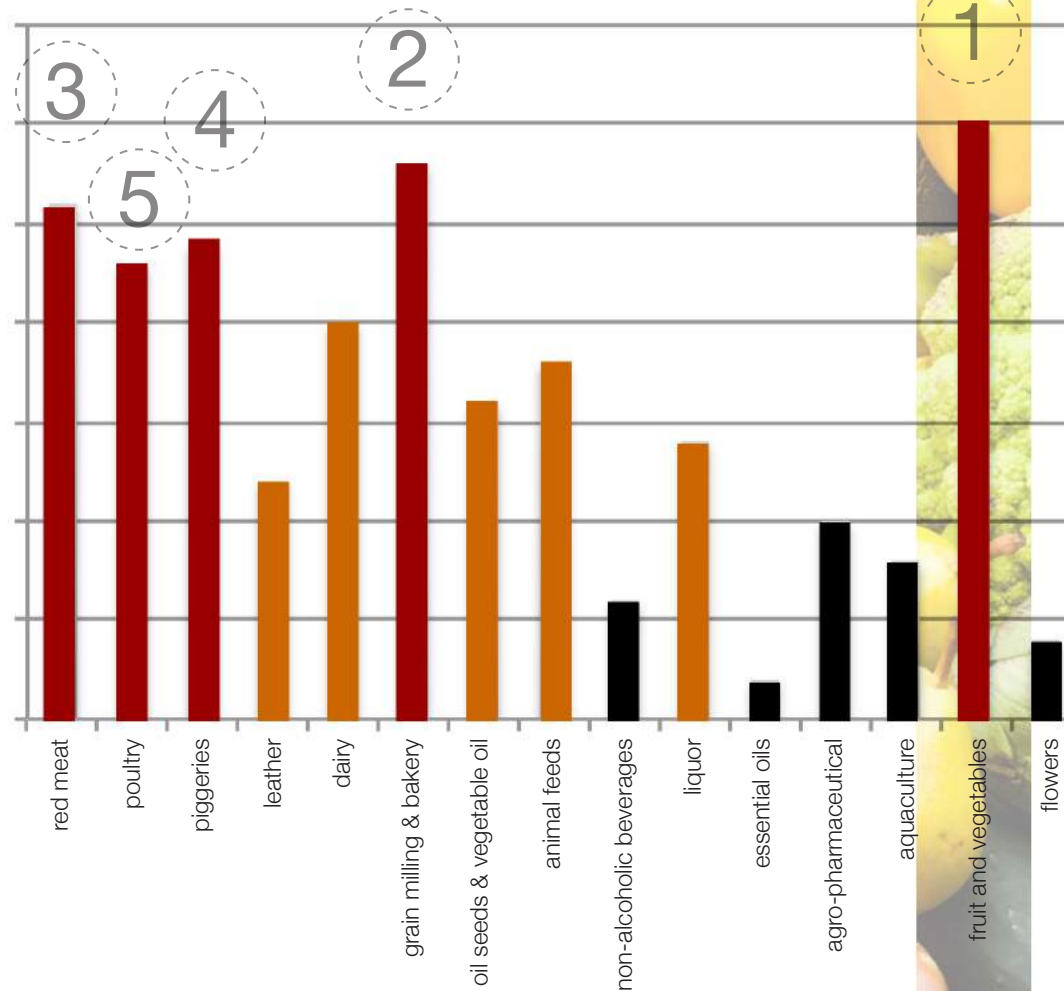


backward and forward
linkages potential rating

The final factor considered in the prioritisation framework evaluated the potential of each industry to strengthen backward and forward linkages.

This refers to the extent that the industry could be catalytic in terms of creating new opportunities, and the potential to enhance primary production (Agriculture and Rural Development 2015:27).

Figure 102 : linkages potential rating_graphical representation (Author 2016)



- First Order Priorities/
high priority
- Second Order Priorities/
medium priority
- Third Order Priorities/
low priority

o p p o r t u n i t y a n a l y s i s r e s u l t s

Based on the evaluation framework and the scoring results presented above, the various industries were ranked in terms of the opportunities for development they offer (Agriculture and Rural Development 2015:28).

Figure 103 : opportunity analysis results_ graphical representation (Author 2016)

conclusion

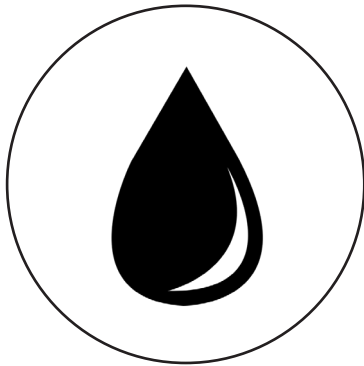
Through the following analysis, it is clear that the production and processing of fruit and vegetables hold the most potential within the food production system.

Fruit and vegetables, first order priority and low in local base production, thus provide an essential opportunity to enable and develop a community through food production.

It is this analysis, as well as the Idaho Plate Method (page 43) that has formed the basis for fruit and vegetable production within the dissertation.

SUB-PROGRAMME

hydroponics & aquaponics



With regards to the greenhouse, hydroponics allow for the control and conservation of water usage. Due to the site sitting on a watershed there is importance in considering the ecosystemic effect that large-scale crop production would have on the area.

Subsequent to research, greenhouses were the chosen method due to the opportunity they provide to optimise production within smaller areas.

Hydroponics is the cultivation of crops by suspending their roots into nutrient rich water solutions rather than in soil (FAO 2014:2). Crop production through soilless means has many advantages, which include:

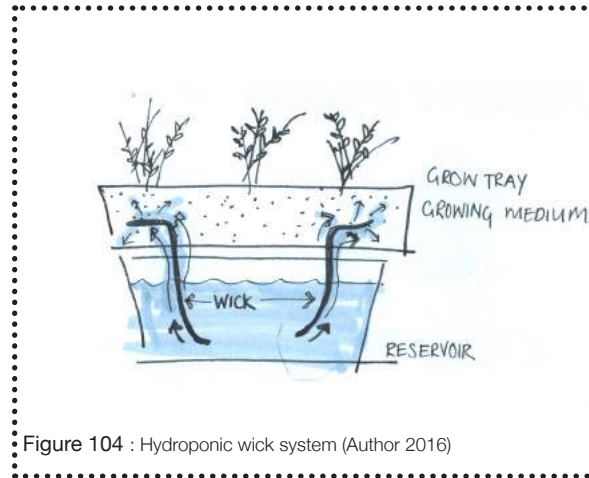


Figure 104 : Hydroponic wick system (Author 2016)

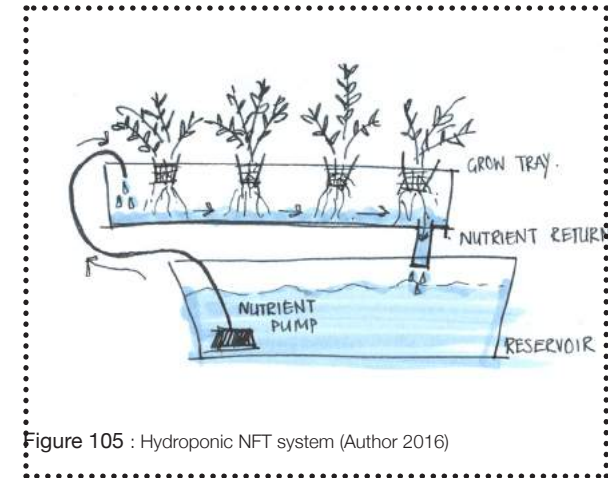


Figure 105 : Hydroponic NFT system (Author 2016)

- Crops are of high quality and do not need much washing
- High yields of vegetables can be produced in limited areas due to the environment being able to be optimal for crop production.
- Water use is efficient due to water loss being limited.
- Good for water-scarce environments
- Soil diseases are no longer an issue and the preparation of soil and weeding are no longer issues (FAO 2014:3).

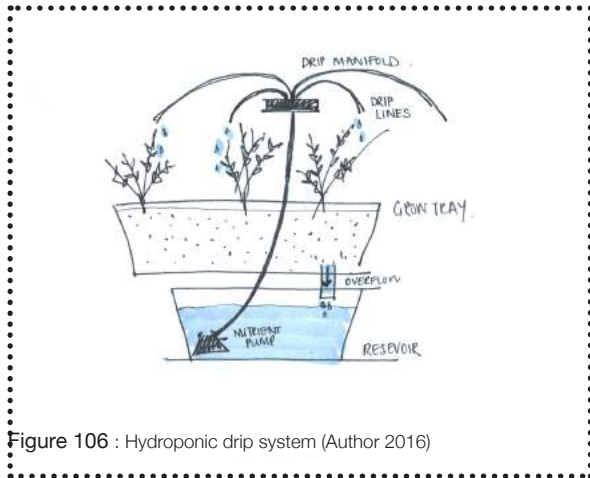


Figure 106 : Hydroponic drip system (Author 2016)

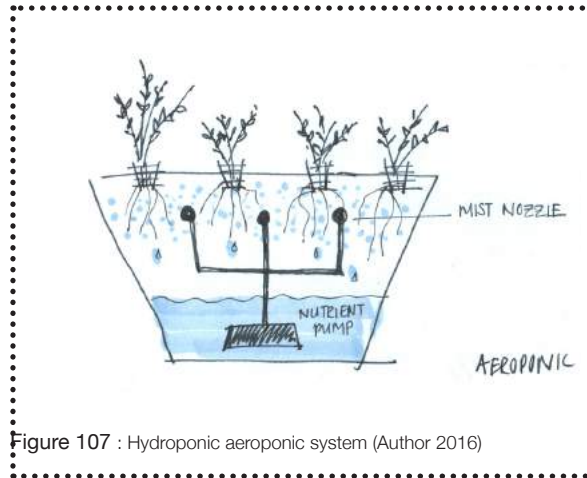


Figure 107 : Hydroponic aeroponic system (Author 2016)

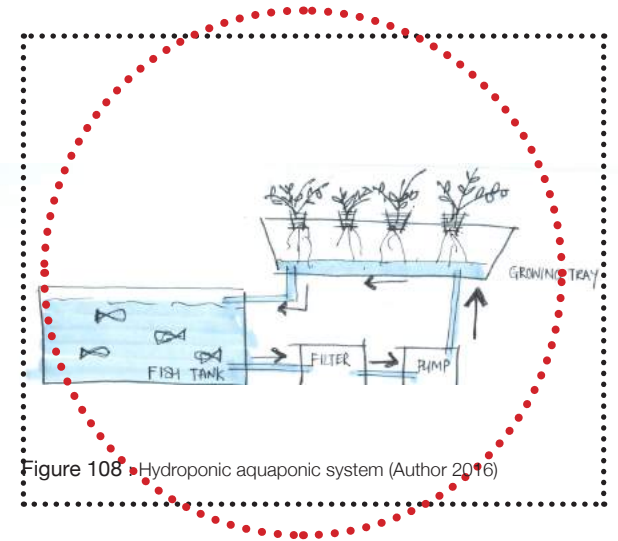
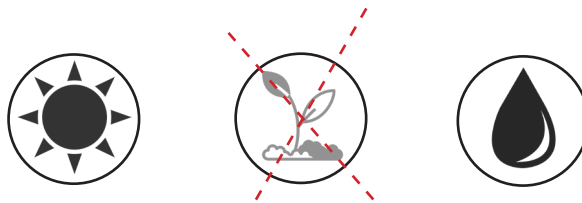


Figure 108 : Hydroponic aquaponic system (Author 2016)

Aquaponics is the incorporation of an aquaculture system into a hydroponic system for plant production (Rakocy & Hargreaves). The fish waste is an organic source of food for the plants and the plants naturally filter the water for the fish.

Microbes within the growing medium convert the ammonia from the fish waste into nitrites and then into nitrates which is utilised by the plants as nutrients. Aquaponics was considered in terms of being able to naturally adjust the PH of the water and thus no artificial additives are required, lessening expenses as well being able to harvest the fish to be sold as protein (FAO 2014:4).



SUB-PROGRAMME

public consumer retail



Market and informal trade become important additions to the scheme. The market makes provision for fresh produce to be sold on site daily and thus makes it easily accessible for those in the surrounding area.

It is thus important to make the provisions for traders to situate themselves on site and contribute to energy of the space. This provision creates the opportunity for residents of Plastic View who previously owned spaza shops to carry on and earn their daily income.

Through the following analysis of local markets it was apparent that spaces should be multi functional and have interesting configurations that encourage consumers to walk around to gain the full experience. The markets within the interior of the space will sell the fresh produce grown and harvested on site but will also allow for local farmers to sell their produce and products.

GUGULETHU CENTRAL MEAT MARKET

Western Cape, South Africa
1997

CS Studio Architects

The aim of the project was to solve the issue of informal traders by providing a covered area for the market. The market, forming a gathering point, has become a very significant public space for the area.

The space accommodates a variety of functions such as spaza shops, offices, public toilets and indoor braai areas. The market is rustic and has roller shutter doors to keep the area secure at night. Stainless steel tables and sinks are provided and the roof, which resembles a giant wave, becomes iconic and encases the whole area thus allowing for the restaurant and informal activity to take place within the same space.

By creating one space that allows for variety activities it allows for a positive and vibrant space that caters for a variety of people and their needs. The market has empowered the growth of the area due to becoming an important resource for the locals, which has resulted in many local residents starting up small businesses. This is what makes for a successful urban environment. It is not just the activities available but also the spaces created and people coming together in one space.

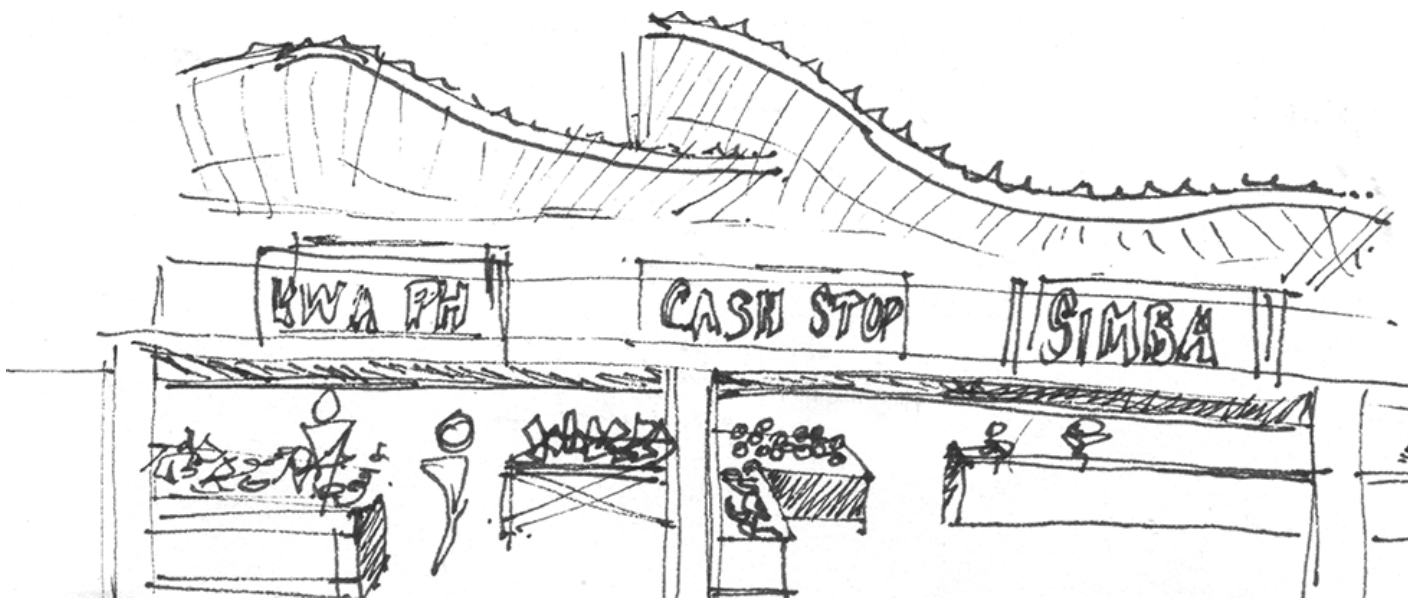


Figure 109 : Gugulethu central meat market sketch (Author 2016)



BOEREMARK

Pioneer Museum
Silverton, South Africa

Boeremark, loosely translated as Farmer's Market, is a fresh produce market that started around 23 years ago as a small market place where small local farmers were able to sell their produce to their consumers directly. The market has now expanded and draws in producers from as far as Mpumalanga and Limpopo.

This extremely successful market is held weekly every Saturday morning from 5:00am to 9:30am. The variety of stalls sells fresh produce, plants, hand crafted items and home made food.

Boeremark attracts a very loyal, wide-ranging customer base. The success of the market stems from customers being able to select their own produce at affordable prices as well as it being a beautiful setting and child friendly. Seating is arranged socially and movable chairs allow for a variety of interactions.

Figure 110 : Boeremark photo collage (Author 2016)

HAZELWOOD FOOD MARKET

Menlo Park, South Africa



The Hazelwood Food Market is held weekly, every Saturday, from 8am until to 2pm. The market offers organic vegetables, handmade cheeses and pestos, flowers, food items and much more. The aim of Hazelwood market is to facilitate a space where locals can buy fresh produce straight from the farmer.

The market started in 2009 with merely 18 stalls and is now sitting at 70 stalls and a long waiting line. There is one communal seating area under a canopy of trees. Jungle gyms are provided for children although most kids play in amongst the trees.

comparison critique

When comparing the two local precedents, theoretical and personal experience critique, it was interesting how much more vibrant and energised Boeremark was, even though it was an early morning affair. Boeremark was more economically and socially inclusive and its more informal style allowed for more interactions between consumer and producer.

A few stalls were present at both markets, although slightly more costly at Hazelwood. Boeremark concentrated more on the consumer and their experience, placing small fires for people to stand and socialise around as well as having a handful of musicians scattered playing for the public. Hazelwood was more confronting and organised. There was not much interaction between consumer and producer due to informal nature in which the stalls were set up.

Figure 111 : Hazelwood food market photo collage (Author 2016)

Camillo Sitte public space theory

Camillo Sitte (1889) in his book, *City Planning according to Artistic Principles*, stated his concern for new modern buildings becoming backdrops for poor public spaces and the importance that lay within the architecture and the buildings and thus neglected surrounding spaces. He claimed that public spaces were vital to cities, when designed properly, in order to form a setting for daily activities and support surrounding buildings and their functions.

Key principles for public spaces include:

- having an enclosed nature in order to restrict views and keep attention within the space
- keeping the centres of the various public squares free and open to allow for ease of communication lines
- ensuring public spaces contain various scales of suitable proportions to allow for the understanding of the space and the extent thereof (Sydney 2012).

97.

Boeremark and Hazelwood

In terms of Boeremark and Hazelwood food market it became apparent that a more informal set up encourages conversation. The informal layout, such as Boeremark, makes provisions for all stall types, (tables, carpets, crates or matts) and includes moveable seating. The set up is done so that it is not in a linear fashion but rather encourages people to maneuver through the space.

Hazelwood was set up in an orderly fashion which allowed people to view all the stalls from one spot and thus did not encourage them to wander around as much.

Natural shade, in both instances, was better received than umbrellas in terms of a social setting. The trees also provided entertainment for active children.

With regards to Sitte (1889), Boeremark was a more successful precedent due to the way in which it was set up. It created spaces between stalls that encouraged social interaction and made various focal points through the use of successful public draw cards, such as musical entertainment and moveable seating.

New Market Hall Granada, Spain

The New market hall in Granada, Spain, uses a Modernist architectural expression for structural elements and materials that sensitively relate, in terms of placement, permeability and scale, to the surrounding older urban fabric.

Avoiding the building as the focal point, the market provides a new edge to the existing outdoor area, which has, through sensitive renovation, been strengthened as an urban element. The addition uses similar materials to create a well-enclosed, walkable space around the building. Human scaled streets are paved and filled with street furniture that enrich ones daily shopping experience.

The market hall forms one side of a sheltered outdoor space. This active urban square is a foreground to the market hall's façade used for produce deliveries and market stalls and incorporates simple landscaping and various opportunities for seating. External connectivity to the market is strengthened through public transport connections to the rest of the city. Thus the market successfully reconnects the city with food-based relationships allowing for sustainable social places.

The market Testaccio, Rome

The market at Testaccio, Rome, takes up a city block in an area configured by a strong rectilinear grid of streets. The semi-enclosed building, without any architectural significance, is an energetic and active market space. Medium to high-density residential and mixed-use units sustain the local support for the market.

The local mixed-use building typology is usually three to eight storeys and has multiple entry points. At street level sit the shops, cafes, small workshops and offices. The contiguous buildings allow for strong edges and thus reinforce enclosure and aid in contributing to suitable height-to-width ratios in the streets neighbouring the market.

successful criteria

Successful quarters like Testaccio and central Granada have created locations that are highly accessible, which encourages a variety of people that are able to arrive by numerous modes of transport other than cars. Boeremark, unfortunately, does not provide this opportunity.

However, all three urban spaces are highly permeable and reinforce their human scale through the absence of large service vehicles. In both Granada and Testaccio, the internal connectivity relates in density and texture to the surrounding urban fabric, while external connectivity is enhanced by public transport links to the rest of the city. Where as at Boeremark, the density is created within the space through a variety of impermanent and permanent structures.

waste management



Vermiculture is the culture and process of using earthworms to decompose organic food waste and turn it into a nutrient-rich material that is capable of supplying necessary nutrients to help sustain plant growth. This method is simple, effective, convenient, and noiseless. It saves water, energy, landfills, and helps rebuild the soil (Maher 2016).

In order to ensure that the food system is holistically considered an effective waste management needs to be applied. Due to food waste being such a large contributing factor to food insecurity it is important to dispose of it properly and ensure that it can give back to the environment. Through vermiculture, organic waste can be turned into vermicompost and either sold back to the community or used in community gardens (Munroe 2005).

Another by-product of vermiculture is worm tea, the liquid concentrate of worm compost, which is a good source of nutrients plants and allows for the microorganisms that live in the worm castings to be a part of a rounded and

balanced feeding system (Maher 2016).

Raised bins, windrows, are fed from the top twice a week and harvested from the bottom once a week.

5 essentials of worm farming include:

- Hospitable living environment “bedding”. The bedding needs to have: high absorbency, good bulking potential and low protein.
- Good food source. Worms require half their body weight of food daily. Fresh food scraps (not high in fat waste). Root vegetables take longer to be consumed. Pre-composted food wastes speeds up curing process. Manure is also a good food source. Biosolids, human waste, excellent nutrition and product destroy human pathogens.
- Adequate moisture. Lack of moisture kills worms. Average worm weight increased with moisture content.
- Adequate aeration
- Protection from temperature extremes. In winter temperature should be kept above 15 degrees Celsius and within the mid 20’s in summer (Munroe 2005).



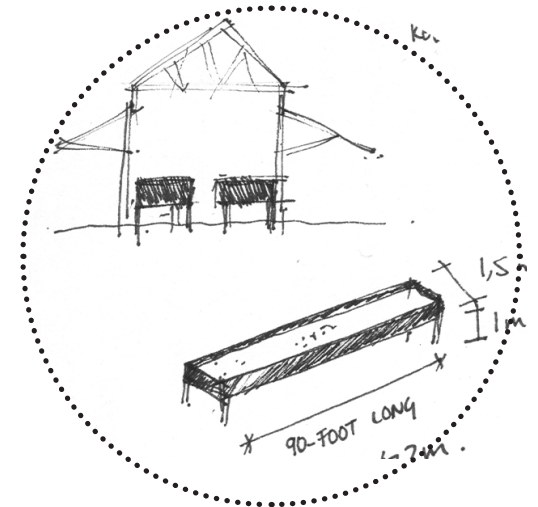


Figure 112 : Window sketch and dimensioning (Author 2016)

EXPLORING WINDOW S



Figure 113 : Worm photo edited by Author (Maher 2016)

VERMICULTURE EARTHWORMS