

# **Food Security in South Africa: Improving the availability, affordability, and quality of fresh produce in informal communities**

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## **DECLARATION OF ORIGINALITY**

I, Darren de Beer, student number 14045924 hereby declare that this report is my own original work, and that the references listed provides a comprehensive list of all sources cited or quoted in this report.



## **EXECUTIVE SUMMARY**

This project addresses the growing concern of food security in informal communities in South Africa by carrying out a case study on the fresh produce supply chain in Soshanguve South. The focus of the project is to determine the best way to efficiently and effectively supply Modular Innobox's Street Fresh with fresh produce.

The solution that has been recommended is called the Street Fresh Delivery Service (SFDS). The service takes orders from the Street Fresh and other street vendors in Soshanguve South, purchases from the Tshwane Fresh Produce Market in bulk on their behalf, and then delivers the orders. The service saves the Street Fresh and street vendors time and money, and is key to improving the availability, affordability, and quality of fresh produce in the community. The service also gives the Street Fresh a competitive edge in the community as a greater variety of produce can be stocked and customer demands can be met.

The implementation plan of the SFDS is outlined in this report. Start-up capital of R65 000 is needed to successfully implement and maintain the service, and a net profit before taxes of R138 700 can be realised after the first 12 months of operation. The SFDS can save a street vendor R50 each day, increase the vendors profits by 35%, and eliminate the need for the vendor to travel to the market every morning. The SFDS can improve the degree of food security in Soshanguve South, and can be implemented in low-income informal communities in Gauteng to improve their fresh produce supply chains.

It is recommended that further research is carried out in the use of cashless systems for the SFDS, establishing a centralised marketplace in the community, establishing direct links with local farmers, and finally the option of re-selling food waste from supermarkets or farms.



## TABLE OF CONTENTS

<b>1. Introduction and Background</b> .....	<b>1</b>
<b>1.1 Introduction</b> .....	<b>1</b>
<b>1.2 Background</b> .....	<b>2</b>
<b>1.3 Rationale</b> .....	<b>3</b>
1.3.1 Project Aim.....	3
1.3.2 Project Scope.....	4
<b>2. Method</b> .....	<b>5</b>
<b>2.1 Activities and Tasks</b> .....	<b>5</b>
2.1.1 Select.....	5
2.1.2 Record.....	5
2.1.3 Examine.....	5
2.1.4 Develop.....	5
2.1.5 Evaluate.....	5
2.1.6 Define.....	5
2.1.7 Install and maintain.....	5
<b>3. Literature Review</b> .....	<b>6</b>
<b>3.1 Food insecurity in South Africa</b> .....	<b>6</b>
<b>3.2 Informal retailers</b> .....	<b>7</b>
<b>3.3 The fresh produce supply chain</b> .....	<b>8</b>
<b>3.4 Supply chain issues experienced by informal food retailers</b> .....	<b>10</b>
<b>3.5 Supply chain improvement recommendations found in literature</b> .....	<b>10</b>
3.5.1 Purchasing.....	10
3.5.2 Transport.....	10
3.5.3 Storage.....	11
3.5.4 Cooperation between informal retailers.....	11
3.5.5 Inventory management.....	11
<b>3.6 Current interventions to improve supply chain processes of informal retailers</b> ..	<b>11</b>
3.6.1 eSpaza’ Sum.....	11
3.6.2 Shop-Net.....	11
3.6.3 The SPAR Rural Hub.....	12
<b>3.7 Interventions to improve fresh produce supply chain of farmers</b> .....	<b>12</b>
3.7.1 Green Buds.....	12
3.7.2 FreshPro.....	12
3.7.3 Farmigo.....	13
<b>3.8 Food waste in the food industry</b> .....	<b>13</b>
<b>3.9 Supply Chain Network Design Methodology</b> .....	<b>14</b>
<b>4. Problem Investigation</b> .....	<b>16</b>
<b>4.1 Introduction</b> .....	<b>16</b>
<b>4.2 Select</b> .....	<b>16</b>
4.2.1 Case study selection.....	16
4.2.2 Boundaries of Study.....	16
4.2.3 Parameters and objectives.....	17
<b>4.3 Record</b> .....	<b>17</b>
4.3.1 Customer requirements.....	17
4.3.2 Profile of current supply chain.....	17
4.3.3 Key supply chain activities and processes.....	19
4.3.4 Supply chain costs and key performance measurements.....	19
<b>4.4 Examine</b> .....	<b>21</b>
4.4.1 Supplier.....	21



4.4.2	Supply chain problems identified .....	21
4.4.3	Improvement opportunities .....	23
<b>4.5</b>	<b>Develop .....</b>	<b>24</b>
<b>4.6</b>	<b>Evaluate .....</b>	<b>25</b>
4.6.1	Evergreens ordering and delivery solutions .....	25
4.6.2	Establish direct links with local farmers .....	26
4.6.3	The Street Fresh Delivery Service (SFDS) .....	26
<b>4.7</b>	<b>Define .....</b>	<b>29</b>
4.7.1	Order system .....	29
4.7.2	Purchasing method .....	29
4.7.3	Delivery .....	29
4.7.4	Solution validation .....	30
<b>4.8</b>	<b>Implementation and maintenance .....</b>	<b>30</b>
<b>5.</b>	<b>Recommendations .....</b>	<b>33</b>
<b>6.</b>	<b>Conclusion .....</b>	<b>33</b>
	<b>References .....</b>	<b>34</b>
	<b>APPENDIX A .....</b>	<b>37</b>
	<b>APPENDIX B .....</b>	<b>39</b>
	<b>APPENDIX C .....</b>	<b>42</b>

## LIST OF FIGURES

Figure 1: Experience of food insecurity in South Africa	6
Figure 2: SFDS daily order sheet	32
Figure 3: Street Fresh exterior	39
Figure 4: Street Fresh interior	39
Figure 5: Location of Soshanguve South	40
Figure 6: Street map of Soshanguve South	41

## LIST OF TABLES

Table 1: Actual and forecasted population urbanised in South Africa (1990-2030)	7
Table 2: Advantages and disadvantages of spaza shops	7
Table 3: Street vendor and Shoprite selling prices of common fresh produce	18
Table 4: Transport costs	19
Table 5: Street vendor profit per product	20
Table 6: Actual daily profit of a street vendor in Soshanguve South	20
Table 7: Supply chain interventions and strategies of different companies	24
Table 8: Impact of Evergreens service on daily profit of street vendor	26
Table 9: Cost analysis of 4-ton truck	27



Table 10: Cost analysis of 8-ton truck	27
Table 11: Profit/loss expected per delivery quantity for 8-ton and 4-ton truck	28
Table 12: Impact of SFDS on daily profit of street vendor	28
Table 13: Expected gross profit after 12 months	30
Table 14: 12-month cash budget plan	31

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## **Abbreviations**

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TFPM – Tshwane Fresh Produce Market

SFDS – Street Fresh Delivery Service

# **Food Security in South Africa: Improving the availability, affordability, and quality of fresh produce in informal communities**

## **1. Introduction and Background**

### **1.1 Introduction**

The food industry can be described as the chain of activities that connect primary producers, manufacturers, processors, wholesalers, retailers and consumers. Globally, the importance of the food industry has increased exponentially as households have become reliant on the purchasing of goods for their dietary needs rather than growing their own food. The food industry provides food security, which is measured by the availability, quality, and affordability of a variety of nutritious products sold through retail or any other food source (Roos, Ruthven, Lombard, and McLachlan, 2013). The Rome Declaration on World Food Security (1996) defined ‘food security’ as existing *‘when all people, at all times, have physical, social and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life’*.

Modern retailers or supermarkets have created fundamental changes in the food system, primarily focusing on food distribution to ensure a regular supply of food (Roos et al., 2013). Efficient supply chains and procurements systems have also resulted in quality and affordable products available to the public. However, many poor urban and rural settlements in South Africa do not have ready access to supermarkets due to the spatial legacy of apartheid, which separated the poorest households from the wealthiest (Battersby and Peyton, 2014). Therefore, low income households depend on the informal retail sector for their access to food. Small general dealers, spaza shops, and street vendors are the main retailers of food products in low-income communities, and it is estimated that these informal businesses have a collective share of 45% in the national food retail market in South Africa (Roos et al., 2013).

Currently, many households in low-income, informal settlements in South Africa are experiencing food insecurity. The first South African National Health and Nutrition Examination Survey (SANHANES-1) found that overall 45.6% of the South African population was food secure, and the largest percentage of participants who experienced hunger were in urban informal (32.4%) and in rural informal (37.0%) localities. A large contributor to this food insecurity is the inability of the informal market to continuously provide quality food that is affordable, which can be attributed to many challenges than informal business owners face. The main challenges are poor business management, poor shop infrastructure, poor procurement strategies, lack of services and support, and insufficient sources of capital (Perks 2010, van Scheers 2010). These challenges make providing a range of quality nutritious products difficult for an informal retailer, especially fresh produce.

## **1.2 Background**

Modular Innobox is a company that designs and pilot's modular businesses inside recycled shipping containers in rural and low-income communities, providing turn key business solutions for a variety of clients. All units are designed to provide social and business functions for clients operating in low-income communities to promote local economic development and encourage sustainability. Modular Innobox caters for a wide range of social and business opportunities in the fields of education, entertainment, retail (informal and formal), health services, government services and e-commerce (Modular Innobox, 2017)

Modular Innobox has designed a unit to improve the current business functions of local entrepreneurs in the informal food retail sector; The 'Street Fresh'. The Street Fresh provides the necessary infrastructure, technology, and support to the shop owner of a Street Fresh unit to effectively manage his/her small food retail business in a low-income community. This micro facility is made from recycled shipping containers and retrofitted with the relevant point of sale, fast moving consumer goods storage, and solar power that can the improve poor shop infrastructure of current informal food retailers. Figures 3 and 4 in Appendix B show the exterior and interior of the Street Fresh respectively.

The Street Fresh, which is a moveable asset, also includes connectivity capabilities that offers informal traders a secure, data driven, solar powered, multi-income stream that has clear operating processes (Modular Innobox, 2017). These functions can improve poor business management, and offer services and support to the shop owner. Moreover, Modular Innobox's vision is to obtain Government grants and Corporate Social Investment to assist current informal entrepreneurs with capital to acquire these units. Therefore, many informal food retailers today could be future Street Fresh owners.

The Street Fresh units have the potential to be reliable sources of quality fresh produce to the communities in which they operate and have the potential to improve the degree of food security in informal communities. However, poor procurement strategies, if not properly investigated, can potentially remain an issue for future Street Fresh units. Currently, poor procurement strategies have a negative effect on the availability, affordability, and quality of the fresh produce that is sold in low-income communities. Transport costs, low or no volume discounts, buying in small quantities, and stock losses due to spoilage and breakage increase the cost price of the food sold. The local retailers also tend to have a limited selection of healthy, nutritious food, and products are frequently out of stock or are past their expiry date. Small general dealers, spaza shops, and street vendors sell predominantly bulk, processed grains (maize meal, rice, flour) and other non-perishable foods like tinned goods, packet soups, oil, soft drinks and packets of crisps because obtaining fresh supplies on a regular basis without easy access to transport is not economical (Pereira, Cuneo and Twine 2014).

Therefore, due to high costs associated with poor procurement strategies, food prices (including fresh produce) in the informal businesses are generally higher, of a lesser quality, and less available than in supermarkets (Roos et al., 2013). The consumers that can afford to travel to supermarkets result in money being spent outside of the community and lost sales for the local





entrepreneurs, and the consumers that cannot afford to travel to supermarkets may experience food insecurity (Pereira 2014). A taxi ride to a supermarket 5km away will cost around R10 one way, and a trip out of a township can cost up to R30 one way (Alcock 2015). This does not include having to pay for an extra seat for grocery bags.

The supply chain activities of a local entrepreneur will play an important role in determining whether his/her business will be profitable, as the fresh produce market deals in very small profit margins. Every Rand saved with efficient procurement strategies will have a large impact on the success of an informal business. Therefore, for Street Fresh units to be successfully integrated into low-income communities, the design of their fresh produce supply chain must be considered.

If a suitable method for efficiently procuring fresh produce is combined with the business functions that the Street Fresh unit offers, then a sustainable turn key business solution will be available for local entrepreneurs to improve their business processes, provide food security, and assist in economically developing their local community.

The benefits that a community can experience from food security go beyond continuous access to a variety of quality nutritious products that the community can afford. Food security plays a key role in poverty alleviation, and can be a driving force in the local economic development of rural and urban low-income communities alike (Meyer, 2014). Moreover, some organisations like the World Economic Forum suggest that there are commercial opportunities for those businesses that find innovative ways to satisfy unmet needs in the food value chains of poor countries and that this could help mitigate food insecurity (Pereira, 2014). Therefore, ensuring sustainable food security for South Africa's informal communities and strengthening the informal food sector is an important topic to be considered.

### **1.3 Rationale**

#### **1.3.1 Project Aim**

The primary aim of this project is to design a supply chain that can efficiently and effectively supply fresh produce to a Street Fresh shop in a low-income community.

The case study defines the current fresh produce supply chain and procurement processes of street vendors operating in a low-income community. The objective of the case study is to highlight the important problems that contribute to food insecurity in the community, and to identify key improvement opportunities in the supply chain. The final step in the case study is designing a supply chain and selecting a procurement strategy for a Street Fresh shop in the low-income community. The key performance measurements of the supply chain are the availability, affordability, and quality of fresh produce sold to the consumer. The cost to procure fresh produce and the overall efficiency of the supply chain are also important performance measures. These performance measures will quantify by how much the new supply chain potentially improves food security in the community and how the Street Fresh can successfully compete in the informal fresh produce economy.



### **1.3.2 Project Scope**

The final deliverable of the project is a solution to supply the Street Fresh in the selected community, Soshanguve South. The solution will be validated using the key performance measures of the supply chain.

The case study focuses on the link between street vendors and their suppliers. The case study investigates the procurement and transportation activities used by street vendors to buy fresh produce from their suppliers. Procurement activities involve the process of selecting vendors (suppliers), establishing payment terms, strategic vetting, the negotiating of contracts and the actual purchasing of goods. Transportation activities involve all the necessary steps to get the products from the suppliers to the point of sale.

The study also encompasses the existing link between farmers and the street vendors' suppliers. This link is only researched in the literature review to gain a larger perspective on the entire fresh produce supply chain, and the activities of the existing link are not recorded. However, the possibility of establishing new links is considered.

The project does not include surveying the population of the selected community to determine the degree of food insecurity in the community. The degree of food insecurity in the community will be defined by statistics found in the literature, as well as by the availability, affordability, and quality of fresh produce sold by different retailers in the community.



## **2. Method**

The systematic approach of a method study has been implemented to investigate and design the procurement processes of fresh produce for Street Fresh owners. A method study can be defined as the systematic recording and critical examination of production, service, and business processes to make improvements. The basic approach that is suggested by Rao (2017) to successfully carry out a method study involves 8 steps: Select, Record, Examine, Develop, Evaluate, Define, Install, and Maintain.

### **2.1 Activities and Tasks**

The following activities and tasks performed in the project are based on the method study described in the Project Approach:

#### **2.1.1 Select**

Define the boundaries of the study, which includes selecting a low-income community for a case study and defining the fresh produce supply chain in that community. Establish the parameters and objectives of the supply chain design or redesign.

#### **2.1.2 Record**

Record and document the process to perform a supply chain audit. The main activity is interviewing informal retailers to gain comprehensive understanding of their current transportation and procurement processes. Ethical clearance has been granted by the University of Pretoria to conduct these interviews; questions can be found in Appendix C. A letter of confirmation can be found in Appendix A. The following information should become available through data collection:

- a. Customer requirements and key environmental factors
- b. Profile of the current supply chain network and the businesses position in the supply chain
- c. Understanding of key supply chain activities and processes
- d. Benchmark for supply chain costs and key performance measurements.

#### **2.1.3 Examine**

Examine the activities of the process and the data recorded in the supply chain audit to highlight problems and improvement opportunities.

#### **2.1.4 Develop**

Develop the adequate knowledge relevant to the shortcomings of the process identified in the previous step by means of an extensive literature review.

#### **2.1.5 Evaluate**

Evaluate alternatives to find their contribution to the improvement of efficiency and effectiveness of the process regarding the key performance measures.

#### **2.1.6 Define**

Select and define the new improved process.

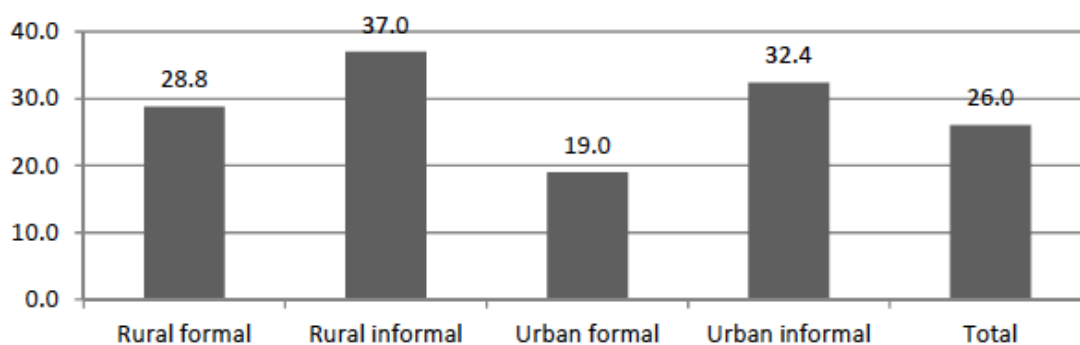
#### **2.1.7 Install and maintain**

### 3. Literature Review

#### 3.1 Food insecurity in South Africa

Food insecurity is a national problem in both rural and urban low-income communities in South Africa. North-West (39.1%), Mpumalanga (31.7%), and Northern Cape (31.5%) experience the highest food inadequacy in South Africa, and Limpopo (8.2%) and Gauteng (16%) experience the lowest food inadequacy in South Africa (Stats SA, 2016). However, when the number of households per province is considered, Gauteng has the highest number of households experiencing food inadequacy. According to Stats SA, about 750 000 households in Gauteng are experiencing food inadequacy.

Urban and rural low-income communities experience different challenges with regards to food insecurity. The long-held belief that urban households are relatively food secure compared to rural households has exposed the recent trend of urban food insecurity in developing countries such as South Africa. Figure 1 shows the prevalence of food insecurity in different types of settlements in South Africa. 26% of South Africans experience severe food insecurity. 37% of residents in rural informal areas and 32.4% of residents in urban informal areas experience food insecurity. This highlights the high food insecurity risk in both rural and urban informal settlements.



**Figure 1: Experience of food insecurity in South Africa (Shisana et al., 2013)**

Furthermore, research within the Southern African region conducted in 2008 found that in poorer areas of 11 cities 77% of surveyed households reported conditions of food insecurity (Frayne et al, 2010: 49).

Housing type is also a further contributor to food insecurity. A statistically significant difference in food security status among different housing types exist. Of those households that are food secure, 84% are living in formal structures, compared to only 12% that live in traditional dwellings and informal conditions (Frayne et al, 2009). Gauteng has the highest number of households that live in informal dwellings in South Africa (Stats SA, 2016).

In South Africa, after 1994, urban areas experienced an unprecedented increase of households as people moved to cities looking for employment and better opportunities. Because of this urbanisation, poverty and food insecurity is also increasing in urban areas (Crush et al 2012). Table



1 shows the actual and forecasted population urbanised in South Africa, and is evidence of urbanisation increasing as rural poor move to cities.

**Table 1: Actual and forecasted population urbanised in South Africa (1990-2030)**

Year	1990	2000	2010	2020	2030
<b>Total population urbanised (millions)</b>	19.15	25.46	30.86	34.63	38.20
<b>Percentage of population urbanised</b>	52.0	56.8	61.5	65.9	69.8

(Source: Crush et al., 2012)

The daily consumption of a variety of fruit and vegetables is essential for good nutrition, human productivity, and child development. Very few low-income households consume an adequate diversity of fruit and vegetables daily in South Africa, and the availability of fruit and vegetables essential for good nutrition is a concern (Hendriks et al., 2016).

A dietary assessment indicated that there is a great need to improve the consumption of diverse diets in low-income communities. According to Hendriks et al. (2016) it is particularly important that these communities regularly consume fresh produce from the following food groups:

- Dark green leafy vegetables such as swiss chard, broccoli, beetroot leaves, cowpeas, beans, pumpkin, and sweet potatoes
- Other vegetables such as cabbage, cauliflower, cucumber, eggplant (brinjal), gem squash, ‘calabash’ or other squash, green beans, green peppers, lettuce, peas, onions and zucchini
- Orange- and red-fleshed vegetables such as beetroot, carrots, dark orange pumpkin, butternut or squash, orange-fleshed sweet potatoes and tomatoes
- Orange- and red-coloured fruit such as citrus fruit, makataan, mango, papaya, pineapple, cantaloupe and watermelon
- Other fruit, including avocados, bananas, figs, loquats and marulas

### 3.2 Informal retailers

Small general dealers, spaza shops, and street vendors are the main retailers of fruit and vegetables in low-income communities. A spaza shop is defined as a shop or business operating in a section of an occupied residential home, or in any other structure on a stand in a formal or informal township which is used for residential purposes, and where people live permanently. Spaza shops are highly accessible to the community as most households are usually within walking distance of at least one spaza shop (Roos, J., Ruthven, G., Lombard, M. and McLachlan, M. 2013). Spaza shops operate with long and flexible business hours which is a great advantage, and many are open 24 hours a day and are mostly used for run-out or daily purchases (Chebelyon-Dalizu et al., 2015). Spaza shops are busiest from 5am-7am and 5pm-9pm (Alcock, 2015). Table 2 highlights the main advantages and disadvantages that characterise spaza shops.

**Table 2: Advantages and disadvantages of spaza shops**

Advantages	Disadvantages
Walking distance from dwellings	Expensive and unstable prices



Long and flexible business hours	Poor customer service
Buying on credit allowed	Stale and poor quality products
Satisfy daily and emergency consumer needs	Poor variety of products

(Sources: Roos et al., 2013, Chebelyon-Dalizu et al., 2015)

Street vendors in South Africa generally sell their food from stands/stalls that are usually not permanent structures next to busy streets in both rural and urban areas. Usually, street vendors only sell a few food items and beverages, and most vendors sell the same items. These items normally include fresh produce, snacks such as crisps and sweets, soft drinks, and cooked foods. Street vendors usually sell food at lower prices than other formal and informal retailers (Steyn, Labadarios and Nel, 2011).

Street vendors play an important role in the fresh produce supply chain by making fruit and vegetables readily available in low-income communities. The following extract from the book *Kasinomics*, written by Alcock (2015), explains one of the common ways that street vendors procure their stock:

*“Maria is informal street vendor that sells red, yellow, and green peppers on a street corner in Johannesburg. Maria is part of an informal buying group and twice a week, she and 15 other ladies wake up at 3 am and take three different taxis to the Johannesburg Fresh Produce Market. At the market, they bargain for their vegetables, spending around R2000 on their purchases. The women then negotiate a transport fee for their vegetables with the hundreds of bakkies that are parked there, and once a bakkie has been chosen and a fee agreed upon, it is split equally. They carefully mark their purchases as they load the bakkie. One lady is selected to travel with the bakkie to their sales point, ensuring that nothing is lost. The rest of the buying group take three taxis back, and by 9am they are packing their vegetables out on crates, cardboard, or tables. Maria makes about R100 profit each day for her efforts.”*

### **3.3 The fresh produce supply chain**

This section summarizes the fresh produce supply chain in South Africa. A good understanding of the supply chain is necessary to see where informal retailers fit in and to evaluate all potential distribution channels of fresh produce.

Fruit and vegetable producers have three main options of where to sell their fresh produce. The first option is to sell their fresh produce to one or more of the National Fresh Produce Markets (NFPM’s). The second option is to sell their produce direct to large market intermediaries outside of the NFPM’s. These intermediaries include large wholesalers and chain stores (supermarkets), or the companies contracted by them to pack and supply the fresh produce. The third option is to sell their produce at a local level to small retail outlets, road stalls, hawkers, and local farmer’s markets. Order quantities in the fruit and vegetable industry are usually bulk as the profit margin is very small on individual products.



Attie Horn, the president of the Institute of Market Agents of South Africa (IMASA), describes the South African fresh produce market system as unique in the world because it functions on a commission basis (Jansen, 2017). The system is governed by legislation that protects the seller (the farmer) and the Agricultural Produce Agents Council (APAC). APAC trains and licences market agents that act as the link between farmers and buyers at the NFPM's.

All fresh produce that is available at the market remains the property of the grower until it is sold. Market agents negotiate the best possible prices for the farmer while still attracting willing buyers with good deals. Market agents earn between 5% and 7% commission on each sale (Jansen, 2017). This commission does not influence the consumer price as it is subtracted from the selling price and not added to it. At the municipal markets, a further 5% commission is subtracted from the final selling price which goes to the municipality for upkeep of the infrastructure and facilities (Jansen, 2017). There are thirteen municipal markets, such as the Tshwane and Durban Fresh Produce markets. The Johannesburg Fresh Produce Market is corporatised and the Cape Town market was privatised in 2010. There are a further ten fresh produce markets in South Africa that are privately owned. According to Potatoes SA, the free market system of selling fresh produce “provides the ideal, inclusive, and transparent trading environment to all fresh produce producers to sell their produce directly to buyers, be they small-scale, emerging, or commercial producers” (Jansen, 2017).

The price of fresh produce at the NFPM's fluctuate daily. The software used at the markets, the Freshmark Electronic Sales Processing System, provides agents with a comprehensive database of prices across all product categories (over 200 products are traded in these markets) with an overview of stock levels, price fluctuations, and averages across a season. Farmers have full access to this database and therefore the exact prices of produce and the information on the quantities of stock at any given point is available to them (Jansen, 2017). Factors influencing price determination include; prices the previous day, prices and quantities on other markets, number of buyers, enquiries from buyers, quantity sold the previous day, and the day of the week (Johannesburg Fresh Produce Market, 2016).

Most spaza shop owners and street vendors procure their fresh produce from wholesalers, followed by the fresh produce markets. The local entrepreneurs rely on informal transport services such as taxi and bakkie operators that provide transport facilities for the smaller scale buyers who need to get the fresh produce they purchase at the market to the point of sale for the end consumer. A small percentage of spaza shops buy produce directly from producers, and supermarkets, hypermarkets, and other retail outlets are used the least to procure goods (Johannesburg Fresh Produce Market, 2016).

Many consumers can now shop from many large supermarket chains online. Pick n Pay Online Shopping allows consumers to shop and order their groceries on the Pick n Pay website, and orders are then conveniently delivered to the homes or businesses of the consumers. Pick n Pay Online Shopping from a consumer's perspective is described “a simple and quick 5-step process to get going - register on our website, tell us where to deliver your order, book a delivery time that suits you, fill your online trolley from our range of products, check out with your credit card,



debit/cheque card and/or smart shopper card and, most importantly, do something fun while we take care of your shopping” (Shop.pnp.co.za, n.d).

### **3.4 Supply chain issues experienced by informal food retailers**

Perks (2010) found that street vendors buy stock in small quantities from a variety of suppliers. Some of the main reasons for purchasing in small quantities are because of a lack of finance, a lack of adequate storage space, and high transport costs. Vendors also do not carry a lot of stock as it is perceived as an invitation to criminals (Tladi and Miehlabrad, 2003). The result of carrying minimal stock is that frequent buying is required, and no goods are received at discounted prices because of the small order quantities (Chebelyon-Dalizu et al., 2015; Perks, 2010). Furthermore, suppliers generally do not offer credit sales, and there is a lack of information flow between vendors and suppliers (Tladi and Miehlabrad, 2003).

According to Perks (2010), informal retailers select fresh produce suppliers based on the following factors:

- Accessibility and proximity of the suppliers to the business
- Special discounts or lowest prices
- Convenience
- Other service provided e.g. loading of stock, trolleys, etc.

Accessibility and proximity of suppliers to the business is a very important factor as informal retailers generally do not get their fresh produce delivered by the suppliers, but rely on taxis, hired vehicles, and other informal transport services for transporting their goods (Perks, 2010). Only other products such as soft drinks, and dairy and bakery products are delivered.

Only a few informal retailers engage in cooperative buying schemes. This is because business owners see competition with other owners as a major issue. It has been found that shop owners do not trust each other. A major factor contributing to this lack of trust is that there are no current channels of communication among informal retailers (Chebelyon-Dalizu et al., 2015).

### **3.5 Supply chain improvement recommendations found in literature**

According to Perks (2010), Tladi and Miehlabrad (2003), and Roos et al. (2013), the following improvements to the supply chains of informal retailers are recommended:

#### **3.5.1 Purchasing**

Using electronic payment methods to purchase goods would save the inconvenience of having cash on the shop premises to make payments. Minimizing the amount of cash on the business premises would minimize the possibilities of cash losses due to theft and robberies. A phone-in order system with the supplier is also an option that is recommended. Suppliers could then pre-pack orders for pickup or delivery, saving the shop owners time.

#### **3.5.2 Transport**

Informal retailers must consider using a reliable transport service that can collect and deliver the goods purchased at a fee. This service would ensure that stock arrives safely and on time at the



point of sale, save the business owner time so that he/she has more time to trade, save the shop owner money in terms of transport costs, and allow the shop owner to be more flexible when selecting suppliers. Because of competition and the fact that many informal retailers stock similar goods, consumers will not wait for goods that are out-of-stock, and will simply move on to the next shop/stand to find what they are looking for. Therefore, a reliable transport strategy is critically important.

### **3.5.3 Storage**

Set up a locally based storage facility/distribution centre that would stock a wide range of products that are normally sold by informal retailers. The benefits realised would be even greater if the facility is owned by the informal retailers themselves. Benefits include time and money saved on transport, storage space to allow for buying in bulk, and infrastructure to keep inventory safe and secure.

### **3.5.4 Cooperation between informal retailers**

Informal retailers will benefit from belonging to a network or association of shop owners/street vendors where buying in bulk as a group would allow for discounts from suppliers. Other special arrangements such as offering credit can be negotiated with suppliers if a network of shop owners is regularly buying in a group. An association should forge a long-term relationship with suppliers to realise even more benefits such as free delivery.

### **3.5.5 Inventory management**

Good inventory control using stock control systems is advisable as about 80 percent of capital is tied up in stock. Exercising visual stock control is also important to determine when stock levels are low. With good inventory management, out-of-stock or expired stock situations can be avoided by linking demand to stock levels.

## **3.6 Current interventions to improve supply chain processes of informal retailers**

### **3.6.1 eSpaza'Sum**

eSpaza Sum Pty (Ltd) is a company with headquarters in Mamelodi, Gauteng, which aims to transform township and rural businesses into formal, professional managed and wealth creating businesses. eSpaza Sum seeks to provide sustainable solutions to informal retailers and traders to grow their businesses and recapture the township retail market, including creating jobs and promoting the circulation of money within townships. One strategy that the company focuses on is assisting spaza shops with procurement. Through bulk buying and long-standing relationships with suppliers, eSpaza Sum supplies informal traders with products, including fresh produce, at the best possible prices. This allows spaza shops to sell their products at very competitive prices, and eliminates many of the problems that spaza shops encounter such as the cost of transport. (Espazasum.co.za, 2017)

### **3.6.2 Shop-Net**

The Triple Trust Organisation (TTO) identified many of challenges and obstacles that spaza owners face in running a successful business, and concluded that one of the greatest weaknesses was the supply chains that the shop owners used to obtain their products. In 2004, TTO developed a business collaboration network between spaza shops to improve their supply chains called the



TTO's Shop-Net program. TTO found that most spaza shops sell the same types of goods to their customers, and therefore have common supply-side needs. Further investigation showed that most shop owners did not receive special treatments or discounts from their suppliers. TTO therefore implemented the Shop-Net program to identify the common products sold at many spaza shops, and then combine the buying power of the shop owners to buy in bulk from suppliers. Buying in bulk would allow for price discounts, which would result in shop owners getting their inventory at cheaper prices and in turn make their shops more profitable (Wp.wpi.edu, 2017).

The Shop-Net program is an example how improving the current supply chain processes of most spaza shops can make their businesses more profitable and allow them to pass better prices and value on to their customers. More affordable prices have the potential to increase sales and make their shops more successful. (SASIX, 2009; Southern Hemisphere Consultants, 2007)

### **3.6.3 The SPAR Rural Hub**

The SPAR retail group, in conjunction with the Amsterdam Initiative against Malnutrition (AIM), is working on a pilot in the Mopani District of Limpopo province – The SPAR Rural Hub project. The aim of this project is to transform local rural retail stores into community hubs with a supermarket and fresh produce distribution centre. Local smallholders will be able to sell their produce at these hubs, and residents will have access to a variety of quality fresh fruit and vegetables. This project will link rural fresh produce supply to local consumer demand and retail requirements by increasing local sourcing from emerging smallholder farmers. Lower income consumers will therefore gain access to improved availability of fresh and nutritious produce.

An important aspect of the project is promoting loyalty to the Hub offering the stakeholders equity in the arrangement. The business structure is such that at the beginning, SPAR will provide certain capital expenditure which will be recouped over time. The small holder farmers and the SPAR retailers who support the hub will also provide equity participation to have a stake in the Hub and therefore have an incentive to remain connected and continue supporting the Hub. SPAR recognises the need for more holistic initiatives that not only focus on agricultural productivity, but also on market access for smallholder farmers and the access to nutritional food for poor households (Barling, 2016).

## **3.7 Interventions to improve fresh produce supply chain of farmers**

### **3.7.1 Green Buds**

Green Buds, founded in 2007, is a company in Limpopo that also provides local farmers with a platform to sell their goods. The company buys fresh produce from local farmers, and then processes and packages the goods to sell to consumers. Farmers drop off fresh produce at the Green Buds warehouse and then value is added and the products are distributed to clients. Green Buds encourages organic growing, and is currently involved with 40 emerging farmers. Farmers do not worry about market access and finding buyers for their goods, and therefore can focus on production (Greenbuds.co.za, 2017).

### **3.7.2 FreshPro**

A common challenge for many farmers is limited access to consumer markets. FreshPro is a Kenyan start-up that uses technology to bridge the gap between suppliers of fruit and vegetables



and consumers. The FreshPro mobile phone application takes orders from customers and allocates the orders to farmers. Orders are then collected from the farmers and delivered to the customer's location by FreshPro's delivery service. This service is very convenient and saves consumers the trouble of traveling to supermarkets.

Farmers are the biggest beneficiaries of this service. Problems such as marketing, where to sell their fresh produce, and communication with customers are all solved. Farmers have more time to focus on production, and can sell their produce at a better cost. Furthermore, the application analyses customer orders and shares this information with farmers to show market trends. This critical information on demand helps farmers to plan production. FreshPro says that this service removes a lot of the risk associated with farming, especially small scale farming, and therefore can increase investment into the agricultural sector (FreshPro, 2017).

### **3.7.3 Farmigo**

Farmigo was an online farmer's market that allowed consumers to shop for locally grown food via the web, and then pick up those orders at nearby locations. Farmigo was founded with the mission to make locally grown food more accessible, as normally consumers would have to visit farmer's markets on weekends to buy food from local farmers, which is usually not very convenient (Perez, 2016). Farmigo brought the farmers and their inventory online so that consumers could shop at any time, and Farmigo's delivery service then made their orders available at designated pickup locations (Farmigo CSA Management Software, 2016). However, the company reportedly could not continue its community delivery operations sustainably, and therefore shut down its delivery service. Farmigo is however discussing partnership opportunities with like-minded companies whose expertise is in logistics to reopen the delivery service (Perez, 2016). The service was operating in New York, New Jersey, Northern California, and the Seattle-Tacoma area.

## **3.8 Food waste in the food industry**

Food waste is a global and national issue, particularly the waste of fresh produce due to its highly perishable nature. In 2013, the losses across the entire food value chain in South Africa was estimated at R61.5 billion per annum, which was equivalent to 2.1% of South Africa's annual gross domestic profit (Nahman & De Lange 2013). The bulk of this waste arose at the processing and distribution stages of the fruit and vegetable value chain, as well as the agricultural production and distribution stages of the meat value chain (Nahman & De Lange 2013).

Agricultural food waste contributes most of the waste in the South African food supply chain. Post-harvest losses in terms of quantity and quality occur during the transportation and storage of fruit and vegetables as they are moved through the supply chain (Vest, 2015). The high standards and policies of retailers also creates food waste, as perfectly edible food that is not aesthetically pleasing, or does not fit into certain size containers, is thrown away (Vest, 2015). Consumers are often concerned with the look of the products, which leaves suppliers discarding a large amount of their fresh produce. Food wastage increases costs for suppliers and retailers because of the costs associated with the disposal of food. The retail sector has support systems to deal with their food wastage, with food prices covering the costs of these systems. Therefore, food wastage drives up the prices of fruit and vegetables (Vest, 2015). However, retailers do not offer support systems to



suppliers for food waste, and therefore most farmers do not have any ways of dealing with their food waste. Dawie Maree, senior economist at AgriSA, says farmers are very willing to donate food waste (that is edible) to those in need, but the proper systems and infrastructure to do so are not in place (Vest, 2015). There are some ad hoc plans with small organizations that deal with farmer's waste, but no comprehensive plans exist.

The Foodies Factory grocery shop group, which run three grocery shops in the Western Cape, resell food that would have been thrown away by supermarkets. The grocery shop specialises in non-perishables that are rejected by supermarkets for passing their sell by date. Rather than dumping expired stock that will end up in landfills, supermarkets sell the stock to the Foodies Factory stores at huge discounts. Supermarkets deliver all their problematic stock to the stores, and then the food is sorted, repackaged, and sold directly to the public at half the supermarket selling prices. The Foodies Factory does not wholesale, and only sells to end consumers. Foodies Factory are currently collaborating with a food testing company to ensure that there are no health risks associated with their products, and that all products are of a good quality (Groceries Unlimited, 2017).

The number of supermarkets that only sell food waste and cafes offering meals produced from food waste are increasing around the world. Adam Smith, project founder of The Real Junk Food Project that operates a food waste supermarket in Leeds, UK, says there are now more than 120 cafes around the world that only use food waste (Hunter, 2016).

### **3.9 Supply Chain Network Design Methodology**

Many factors must be considered when determining the optimum design of a supply chain network. Designing or redesigning a supply chain for a business can be complex. The following steps form part a major supply chain transformation process (Coyle et al., 2016).

#### **Step 1: Define the supply chain**

- Become aware of overall business strategies and the underlying needs of the business and the supply chain in which it operates.
- Establish the parameters and objectives of the network design or redesign.
- Address possibility of potential involvement of third-party logistics services as a means of achieving supply chain objectives.

#### **Step 2: Perform a supply chain audit**

- Gain comprehensive understanding of current logistics process. The following information should become available:
  - a. Customer requirements and key environmental factors
  - b. Key logistics goals and objectives
  - c. Profile of the current supply chain network and the businesses position in the supply chain
  - d. Understanding of key supply chain activities and processes
  - e. Benchmark for supply chain costs and key performance measurements
  - f. Identification of gaps between current and desired supply chain performance



- g. Key objectives for supply chain network design, expressed in terms that will facilitate measurement

**Step 3: Examine the supply chain network alternatives**

- Apply suitable quantitative models to the current logistics systems as well as to the alternative systems and approaches under consideration. Modelling approaches include optimization, simulation, or heuristic models.
- Use modelling approach to help identify a supply chain network consistent with the key objectives identified in step 2.
- Perform “what-if” types of analysis to preliminary design solutions to test sensitivity of recommended network designs to changes in key variables.

**Step 4: Conduct a facility location analysis**

- Carefully analyse the attributes of specific regions and locales that are candidates for sites of logistics facilities, distribution centres, cross-docking operations, etc.

**Step 5: Make decisions regarding network and facility location**

- The network and specific sites for logistics facilities recommended in steps 3 and 4 should be evaluated against the design criteria in step 1.
- This step will confirm the changes that are needed in the businesses logistics network.

**Step 6: Develop an implementation plan**

Plan must serve as a useful roadmap for moving from current supply chain network to desired one.



## 4. Problem Investigation

### 4.1 Introduction

The outcomes of the seven activities and tasks described in the project method are presented in the following section. A community is selected for a case study, and data is gathered from street vendors operating in the community to define the fresh produce supply chain. The data is examined to highlight key problems and improvement opportunities in the fresh produce supply chain, and the relevant knowledge that has been developed in the literature review is summarised. Thereafter different alternatives to supplying Street Fresh shops are evaluated, and a final solution is defined. Finally, implementing and maintaining the solution is discussed.

### 4.2 Select

#### 4.2.1 Case study selection

The fresh produce supply chain of Soshanguve South, a low-income urban area in Gauteng with informal dwellings, has been selected for the case study. The main reasons for this selection are described below.

Research has shown that in South Africa, the percentage of food insecurity in rural areas is greater than in urban areas. However, because of urbanisation the rates of food insecurity are increasing in urban areas. By 2020, it is estimated that nearly 66 percent of South Africans will be living in urban areas as rural poor move to cities in search of employment opportunities.

According to Stats SA (2016), Gauteng has the highest number of households per province experiencing food insecurity in South Africa. Food insecurity is more prevalent in informal dwellings than formal dwellings, and Gauteng has the highest number of households that live in informal dwellings in South Africa.

Soshanguve, a part of the City of Tshwane Municipality, is Pretoria's largest township and situated is about 25km north of Pretoria (Stats SA, 2014). Soshanguve is a 100 percent urban area with 36,2 percent of the population residing in informal dwellings. It exhibits both rural and urban characteristics, and displays typical features of townships all over South Africa including a strong shack dwelling (Stats SA, 2014). Mokwena (2016) in a study on the impact of social grants on food security, found that 61 percent of Soshanguve's population experience some sort of food insecurity, with 38 percent experiencing severe food insecurity. A street map of Soshanguve South (figure 6) and a map showing the location of Soshanguve South relative to Pretoria (figure 5) are available in Appendix A. No formal count has been done to determine the number of street vendors in Soshanguve South, but based on observations during visits to the community, the number is greater than 20.

#### 4.2.2 Boundaries of Study

The fresh produce supply chain of informal street vendors in Soshanguve South is under investigation. Preliminary findings showed that the Tshwane Fresh Produce Market is the ultimate source of fresh produce for street vendors in Soshanguve South. Therefore, this case study focuses on the supply of fresh produce between the TFPM and street vendors operating in Soshanguve





South. Hebron Road is the main road that runs through Soshanguve South, and all data was gathered from street vendors that work on this road.

The following main areas in the fresh produce supply chain are under investigation:

- a) How do street vendors purchase stock from the TFPM?
- b) What costs are involved with procuring and transporting stock from the TFPM?
- c) What are the key supply chain constraints for street vendors?

The feasibility of establishing direct links with farmers also falls within the boundaries of the study, but is not the focus.

### **4.2.3 Parameters and objectives**

The key performance measurements used to quantify the success of the Street Fresh supply chain cannot be worse than the performance measurements of the existing supply chain. The improved supply chain must be easy to integrate, install, and maintain. The supply chain must give the Street Fresh a competitive edge in the market and serve the needs of the informal community.

## **4.3 Record**

### **4.3.1 Customer requirements**

The main customer requirement in Soshanguve South is affordable food. Many people living in the poor community have a desperately low food budget, and so the street vendors aim to set selling prices that their customers can afford.

The customer's perspective of quality is defined by the appearance (cosmetic look), freshness, and value for money of the fresh produce sold by street vendors. Value for money and the freshness of the fresh produce is more important to customers than the appearance. For this reason, street vendors buy lower quality graded produce from the market that is cheaper.

Customers require that the street vendors are open into the evening. Many people living in Soshanguve South return home after work in the early evening and buy from the street vendors on their way home.

### **4.3.2 Profile of current supply chain**

The Tshwane Fresh Produce Market is the ultimate source of fresh produce for street vendors operating in Soshanguve South. Located in Pretoria West, the TFPM is approximately 30km from Soshanguve South. The market is open from Monday to Saturday each week. On weekdays, the market is open from 05:00 – 13:00 and on Saturdays the market is open from 05:00 – 11:00.

Fruit and vegetable producers sell and deliver their products to the TFPM. All fresh produce that is available at the market remains the property of the grower until it is sold. Market agents negotiate the best possible prices for the farmer while still attracting willing buyers with good deals, and it is from these market agents that street vendors purchase their products. The street vendors select and purchase their produce in person, and typically aim to be at the market when it



opens to find the best deals and purchase the products of a lower quality grade - these are the cheapest.

The street vendors usually buy as much stock as they can afford. Daily purchase quantities range from 400kg to 600kg, and the most frequently bought produce are potatoes, tomatoes, onions, cabbage, and pumpkin.

Street vendors do not have their own modes of transport and travel to and from the market using taxi's. Taxis are the cheapest mode of transport out of the township. The street vendors wake up at between 03:00 and 04:00 to be at the market on time. If street vendors arrive at the market too late they wait in long queues and may not get all their stock in time.

Bakkies and small trucks wait outside the market to offer transport services to the many buyers of fresh produce. Once all products are purchased, the street vendor finds a bakkie or truck traveling to Soshanguve South to take his/her produce at a negotiated fee. The vendors negotiate until they find the cheapest transport available, and therefore regularly use different transporters. One bakkie/truck usually transports stock for several vendors at once. The vendors then travel back to Soshanguve South via taxi and wait for delivery to their stands. Vendors sometimes travel back with the bakkie/truck; however, this is not common and is more expensive. The vendors arrive back at their stands between 09:00 and 10:00. This trip is made daily or two to three times a week.

Street vendors sell their fresh produce from 10:00 to 19:00 or until they sell out. Their busiest times are 16:00 to 19:00, and their highest daily demands are on Fridays and Saturdays. As mentioned, the street vendors reported that they regularly sell all their products daily. Produce that is not sold or taken home by the vendor is thrown away or sold to livestock farmers at a large discount.

Table 3 compares the selling prices of common products sold by street vendors and the selling prices of the same products at the nearby Shoprite, which is a large supermarket chain store. Street vendors have lower selling prices than the Shoprite. There are three reasons for these low prices: Firstly, the vendors want to offer fresh produce that the low-income community can afford. Most people living in the selected community are poor and therefore have a very tight food budget, and so to increase sales the informal retailers drop their prices so that their products are more affordable. Secondly, the informal business owners understand that they are in competition with the Shoprite, and therefore will always ensure that their selling prices are lower. Thirdly, the business owners are in competition with one another. Street vendors do not want to be undercut by the neighbouring vendors and therefore make their selling prices as low as possible because of fear of lost sales. The result is that almost all retailers in the main road sell produce at the same low prices.

**Table 3: Street vendor and Shoprite selling prices of common fresh produce**

<b>Product</b>	<b>Street vendor price (R/kg)</b>	<b>Shoprite price (R/kg)</b>
Potatoes	4.50	5.00
Tomatoes	6.60	20.00
Onions	3.50	5.50



	Street vendor price (R/unit)	Shoprite price (R/unit)
Cabbage	15.00	17.00
Pumpkin	20.00	20.00*

\*Pumpkins were smaller

### 4.3.3 Key supply chain activities and processes

The two key supply chain activities are the purchasing of stock at the TFPM and the transportation of stock from the TFPM to the street vendor’s stall.

As mentioned before, the street vendors travel early in the morning to the market via taxi to purchase fresh produce. To purchase stock at the market, the street vendor must have a market account and a buyer’s tag. There are two types of market accounts available; a credit account or a registered cash deposit account. To use a credit account, an application form must be completed and a bank guarantee submitted as surety. All forms of payment are accepted for a credit account.

The street vendors from Soshanguve South use the registered cash deposit account. To use a registered deposit account, an application form must be completed. Only cash and electronic payments are accepted for this account, and funds must be deposited into the account before purchases can be made. Once the buyer has chosen which account type to use and acquired a buyer’s tag, he/she can immediately procure fresh produce from any market agent.

Street vendors do not use the same market agents for every purchase. Therefore, the process of selecting which market agent to purchase from and negotiating prices is important to consider. Finally, the process of finding transport for the fresh produce back to Soshanguve South and the activity of transportation are vital to the fresh produce supply chain.

### 4.3.4 Supply chain costs and key performance measurements

The key supply chain cost is transport. Table 4 shows the costs of traveling to and from the TFPM via taxi from Soshanguve South, and the cost per kilogram to rent space on a bakkie or truck to transport fresh produce from the market to Soshanguve South. Street vendors negotiate the cheapest transport each time they purchase from the market, and 30c/kg was the cheapest cost recorded. The highest cost recorded was 40c/kg. Street vendors can negotiate cheaper costs (30c/kg) when they transport larger quantities.

**Table 4: Transport costs**

Taxi ride (one way to market)	Taxi Ride (two way)	Delivery (per kg)
R17	R34	30c – 40c

The availability, affordability, and quality of stock are key performance measures of the supply chain. The availability of stock is defined by two key factors; the variety and quantity of fresh produce available. The variety of fresh produce sold by street vendors mainly includes potatoes, tomatoes, onions, pumpkin, and cabbage. Street vendors reported that they usually sell all their products daily and would like to increase their purchase quantities to meet demand. Quantity is important because if consumers do not find what they are looking for, they will simply move on to the next stand. The fresh produce is considered affordable as the selling prices reordered at the

street vendors are lower than Shoprite's prices. Customers are satisfied with the quality of fresh produce.

The total time it takes for street vendors to procure their fresh produce is an important performance measure. Currently street vendors spend approximately 1 hour traveling to and from the market. In addition, it takes between 3 and 4 hours to purchase all stock from market agents and find transport for their fresh produce. Therefore, the total time spent procuring fresh produce is between 4 and 5 hours.

Profit is a key performance measurement. Table 5 shows the profit per unit made on a 10kg bag of potatoes, a 6kg box of tomatoes, and a 10kg bag of onions. The average selling prices (table 3), average delivery cost (table 4), and cost prices from the TFPM have been used. Therefore, the respective profits calculated are only an indication and do vary from vendor to vendor. The fixed cost of the taxi fare has not been included in the profit calculation.

**Table 5: Street vendor profit per product**

	Potatoes – 10kg bag	Tomatoes – 6kg box	Onions – 10kg bag
Cost Price	R38.00	R35.00	R26
Transport Cost @ 35c/kg	R3.50	R2.10	R3.50
Average Selling Price	R45.00	R40.00	R35
Profit	R3.50	R2.90	R5.50

Table 6 shows the actual daily profit made by a street vendor in Soshanguve South. The vendor normally sells approximately 30 bags of potatoes and 20 boxes of tomatoes per day, and sells five days a week. The vendor purchases from the TFPM and uses taxis for transport. His transport costs are usually 32c/kg. It is important to note that the daily profit is not added to the street vendor's capital for future purchases. This profit is taken home and used to sustain the vendor and his family. This scenario is used in section 4.6 to evaluate the effect that alternative solutions will have on this vendor's daily profit.

**Table 6: Actual daily profit of a street vendor in Soshanguve South**

	Description	R	
<b>Sales</b>			<b>2150.00</b>
	30 x 10kg bag potatoes @ R45.00	1350.00	
	20 x 6kg box of tomatoes @ R40.00	800.00	
<b>Less: Cost of goods sold</b>			<b>(1840.00)</b>
	30 x 10 kg bag potatoes @ R38.00	1140.00	
	20 x 6 kg box tomatoes @ R35.00	700.00	
<b>Less: Transport cost</b>			<b>(168.40)</b>
	Purchase quantity (420kg) @ 32c/kg	134.40	



	Taxi fare (two way)	34.00	
<b>Profit</b>			<b>141.60</b>

Finally, the overall efficiency of the supply chain that will be discussed in section 4.4, is an important performance measure.

#### 4.4 Examine

##### 4.4.1 Supplier

The TFPM is convenient, accessible, and a reliable supplier. Street vendors can always expect to find their products at the market at the lowest prices. All fresh produce sold at the market is of a high quality, and street vendors can choose from different quality grades of the same product. The market is located approximately 30km from Soshanguve South, and the road between the market and Soshanguve South is well suited for bakkies and trucks.

The Tshwane Market offers buyers the following:

- Modern facilities that will meet the present and future demands of users
- The whole spectrum of fresh produce that South Africa produces at the lowest prices
- Clean market floors for a pleasant and healthy visit
- Information systems that meet the demands of all buyers
- Market information
- A budget control system that ensures accurate financial management information and general accountability
- Regular product audits
- Regular monitoring of prices, product age and grading requirements
- Products are regularly inspected for residue
- Products that are unsafe for human consumption are removed daily
- Trolleys for hire
- Security that safeguards buyers and assets
- Credit facilities and a user-friendly sales system
- Market is open 6 days a week

However, there are also disadvantages of purchasing from the Tshwane Fresh Produce Market.

- The market does not allow for street vendors to order and collect
- The street vendors must select and purchase their fresh produce in person
- The market does not offer a delivery service

The problems associated with these disadvantages will be discussed in section 4.2.2.

##### 4.4.2 Supply chain problems identified

- i. Street vendors select and purchase fresh produce from market in person

The market does not allow for street vendors to order and collect. Therefore, the vendors must travel to the market to purchase their goods. This process is time consuming (4 – 5 hours) and inefficient. The street vendors wait in long queues to purchase from market agents, and sometimes cannot purchase all their stock in time. The lower quality graded products are the most popular amongst many buyers as these products are the cheapest. If the street vendors do not arrive at the market when it opens they miss out on these cheaper products.

A direct cost of R34 is incurred every time the street vendors travel to the market and back via taxi. The street vendors wake up between 03:00 and 04:00 to get to the market, and usually sell their fresh produce until 19:00. The long hours may play a role in decreased productivity of the street vendor. Furthermore, if the taxis are not operating then the street vendors have no means of getting to the market and therefore lose an entire day of sales. For example, taxis may not be operating due to strikes/protests. Every street vendor said that they wanted to improve their purchasing process, but do not have the means to do so.

ii. The market does not offer a delivery service

For this reason, the street vendors use the many bakkies and trucks parked outside the market as explained in section 4.3.2. The cost of this transport is not fixed, and the vendors regularly use different transporters. The street vendors also usually do not purchase enough to fill an entire vehicle, and therefore vehicles carry stock for other vendors too. The street vendors have little bargaining power, and the process of finding cheap transport is time consuming and difficult. The street vendors have no other options but to use these transport services.

iii. Small order quantities

The street vendors buy in relatively small quantities. This is mainly due to a lack of capital. The vendors reported that they would like to increase their buying quantities to meet demand and increase sales but they can only buy as much produce from the market as they can afford on the day. Therefore, no quantity discounts are received from market agents or from the transport services. A lack of storage space also results in small order quantities as the vendors only purchase the amount of stock that they know they will sell during the day. The result is that the vendors must travel to the market regularly which increases traveling costs.

iv. Lack of variety

The main products sold by street vendors are potatoes, tomatoes, onions, cabbage, and pumpkin. This variety is poor, especially because hardly any fruit is sold. This is also due to a lack of capital and because the street vendors prefer to buy the cheapest products in the largest quantities possible. Furthermore, purchasing a wide variety of produce at the market increases the total time to procure stock. The street vendors reported that they would like to improve their variety.

v. Low profit margins

The ranges of selling prices recorded are shown in table 5. The low selling prices benefit the community in terms of the affordability of fresh produce, however profit margins are low. This low profit margin is potentially one of the major causes of food insecurity, poor business growth, and poor local economic development in the community. Less profit results in less capital available for informal retailers to use. This directly reduces the retailer's ability to buy more stock, buy better quality stock, or buy a greater variety of stock. Furthermore, retailers have less capital to invest into their businesses, and overall local economic growth is negatively affected.



#### **4.4.3 Improvement opportunities**

- i. Eliminate the need for the Street Fresh owner to select and buy fresh produce in person from the TFPM. This will avoid unnecessary transport costs and will increase the time that the owner can spend selling goods. Therefore, the flow of information between the Street Fresh owner and suppliers is important.
- ii. There is a great opportunity to improve the variety of fruits and vegetables in Soshanguve South. Improving the variety of fresh produce in the community can improve food security and give the Street Fresh a competitive edge over other informal retailers that stock similar products. Therefore, sourcing a variety of fresh produce from the TFPM is important.
- iii. Profit margins in the informal fresh produce sector are small, and a Street Fresh owner can expect similar profit margins. This is because to remain competitive and affordable, the Street Fresh owner will have to sell his/her fresh produce at very similar prices to other informal retailers in the community. Therefore, reducing transport costs of fresh produce from suppliers and receiving quantity discounts to increase profit margins are important to achieve through effective supply chain design.
- iv. An efficient and effective supply chain will directly contribute to the success of the Street Fresh. In addition to selling fresh produce to consumers, the Street Fresh can potentially supply other street vendors or be the main link in a large buying group to increase order quantities to receive discounts.

#### 4.5 Develop

Supply chain improvement recommendations for informal food retailers are described in the literature review. These recommendations will be considered to design and evaluate alternative solutions to supply fresh produce to the Street Fresh. In addition, the supply chain activities and interventions of various companies presented in the literature review will also be considered. These supply chain activities and interventions are summarised in table 7.

**Table 7: Supply chain interventions and strategies of different companies**

<b>Project/ Company</b>	<b>Primary Beneficiaries</b>	<b>Focus Areas</b>	<b>Primary Benefits</b>
<b>eSpaza'Sum</b>	Spaza shops	Bulk buying	<ul style="list-style-type: none"> <li>• Reduced product costs and discounts</li> <li>• Reduced transport costs</li> </ul>
<b>Shop-Net</b>	Spaza shops	Bulk buying	<ul style="list-style-type: none"> <li>• Reduced product costs and discounts</li> <li>• Reduced transport costs</li> </ul>
<b>SPAR rural hub</b>	Farmers & consumers	Fresh produce distribution centre in rural community	<ul style="list-style-type: none"> <li>• Increased local sourcing from smallholder farmers</li> <li>• Improved availability of fresh produce</li> </ul>
<b>Green buds</b>	Farmers	Platform for local farmers to sell their fresh produce	<ul style="list-style-type: none"> <li>• Farmers do not have to worry about market access and finding buyers</li> </ul>
<b>FreshPro</b>	Farmers & consumers	Bridge gap between farmers and consumers using mobile phone application and delivery service	<ul style="list-style-type: none"> <li>• Farmers do not have to worry about market access, transport, and finding buyers</li> <li>• Saves consumers the trouble of traveling to supermarkets</li> </ul>
<b>Farmigo</b>	Farmers & consumers	Bridge gap between farmers and consumers using mobile phone application and delivery service	<ul style="list-style-type: none"> <li>• Farmers do not have to worry about market access, transport, and finding buyers</li> <li>• Saves consumers the trouble of traveling to supermarkets</li> </ul>
<b>Foodies Factory</b>	Consumers	Resell food waste from supermarkets	<ul style="list-style-type: none"> <li>• Reduce food waste</li> <li>• Resell food at large discounts</li> </ul>
<b>The Real Junk Food Project</b>	Consumers	Resell food waste from supermarkets	<ul style="list-style-type: none"> <li>• Reduce food waste</li> <li>• Resell food at large discounts</li> </ul>
<b>Pick n Pay Shopping Online</b>	Consumers	Convenient online shopping and delivery for consumers	<ul style="list-style-type: none"> <li>• Saves consumers the trouble of traveling to supermarkets</li> </ul>

The procurement strategy of group bulk buying used by eSpaza'Sum and the Shop-Net program have proved to successfully reduce overall costs for spaza shop owners and improve business efficiency. The SPAR rural hub, Green buds, FreshPro, and Farmigo have shown that it is possible to establish direct links between local farmers and consumers using mediums such as technology



and delivery services, and infrastructure such as centralised buying and distribution centres. The methodology behind these interventions can be used to establish direct links between local farmers and informal retailers.

Pick n Pay, FreshPro, and Farmigo have eliminated the need for consumers to travel to supermarkets to buy their groceries by using online platforms. Similar platforms could be designed to eliminate the need for informal retailers to travel to their suppliers to buy fresh produce. Finally, the Foodies Factory and The Real Junk Food Project have shown that although very unconventional, food waste from supermarkets can be purchased and resold at discounted prices. This highlights the possible opportunity for informal retailers to do the same.

The interventions and solutions that these companies provide can potentially be adapted and incorporated into the design of the Street Fresh supply chain, and therefore will play an important role in determining the various alternatives to efficiently and effectively procuring fresh produce.

## **4.6 Evaluate**

### **4.6.1 Evergreens ordering and delivery solutions**

Evergreens is a company in Pretoria that offers a service whereby fresh produce can be ordered online and delivered the next day. The fresh produce is sourced from the Tshwane Fresh Produce Market and is of high quality. The online ordering platform offers the following:

- In-store pricing that is updated twice a day
- On-the-day availability and stock adjustments
- Full product searches
- Full transaction history
- Pre-paid accounts available

Evergreens can deliver orders of more than R500 to Soshanguve South for a fixed fee of R150. Orders that are made before 15:00 are delivered the following day. Evergreens marks-up the prices of fresh produce from the TFPM.

The Evergreens ordering and delivery service offers a wide variety of fruit and vegetables, and large quantities can be ordered to meet daily demand. The fresh produce is of a very high quality, and for order quantities that are greater than 360kg, the transport costs for the Street Fresh will be lower. This service will save the Street Fresh owner between 4 and 5 hours each day, and the Street Fresh's internet connection will assist with placing orders. However, the cost prices of the fresh produce are substantially higher than the prices at the market.

If the street vendor uses the Evergreens service a loss of R197.50 will be made, as shown in table 8. The cost price of a 6kg box of tomatoes is R49.95 and the selling price is R40.00. As discussed, it is not recommended that the selling prices of fresh produce are increased, and therefore are unchanged in this table.



**Table 8: Impact of Evergreens service on daily profit of street vendor**

	Description	R	
<b>Sales</b>			<b>2150.00</b>
	30 x 10kg bag potatoes @ R45.00	1350.00	
	20 x 6kg box of tomatoes @ R40.00	800.00	
<b>Less: Cost of goods sold</b>			<b>(2197.50)</b>
	30 x 10 kg bag potatoes @ R39.95	1198.50	
	20 x 6 kg box tomatoes @ R49.95	999.00	
<b>Less: Transport cost</b>			<b>(150.00)</b>
	Fixed cost	150.00	
<b>Loss</b>			<b>(197.50)</b>

The Evergreens ordering and delivery service is an excellent supply chain solution for many businesses that are not constrained by the selling prices of their fresh produce. The Street Fresh will lose a major competitive advantage if its selling prices are significantly higher than the selling prices of other street vendors. Moreover, the performance measure of affordability will worsen, and thus the first alternative of Evergreens service will not work in the Street Fresh supply chain.

#### 4.6.2 Establish direct links with local farmers

The second alternative is to establish direct links between the Street Fresh and local farmers. Farmigo and FreshPro created direct links between farmers and consumers and therefore this alternative is worth further investigation.

The main benefit of purchasing directly from farmers is that the product cost will be less than the fresh produce prices at the TFPM. However, the supply chain will be complicated because to purchase a variety of fresh produce, multiple farmers will be involved. Furthermore, a constant supply of fresh produce will be difficult to ensure, and high quality cannot be guaranteed. This will increase the risk of lost sales.

High transport costs will be incurred from sourcing from different farmers, and if the farmers cannot deliver then the procurement time for the Street Fresh owner will be a problem. Therefore, establishing direct links with farmers will not be efficient or effective.

It is recommended that further research be carried out on how to establish direct links between local farmers and whole communities, such as the SPAR-rural hub, but this alternative will not work for supplying the Street Fresh only with Fresh Produce.

#### 4.6.3 The Street Fresh Delivery Service (SFDS)

The Street Fresh shop can offer a delivery service to street vendors. This service will take daily orders from several street vendors, purchase from the Tshwane Fresh Produce Market on their behalf, and then deliver their order to their stalls in Soshanguve South. The Street Fresh owner will also use this service to procure his/her own fresh produce. The vendors will pay the market



prices for their products, and will pay for the delivery service. A truck will be rented monthly to transport and deliver fresh produce from the market to Soshanguve South.

This solution focuses on improving purchasing and transport methods, and cooperation between informal retailers. It uses the concept of bulk buying to reduce product costs by allowing for quantity discounts and a reduction in transport costs. eSpaza'Sum and Shop-net have implemented similar solutions for spaza shop owners by buying in bulk.

The SFDS can increase the profitability of the Street Fresh without increasing selling prices and will be a second income stream for the shop. This delivery service will save the Street Fresh owner and other street vendors time. There will be no need for the informal retailers to wake up early and spend between 4 and 5 hours procuring their stock from the market.

A summary of the daily costs to run the Street Fresh Delivery Service are presented for a 4-ton truck and an 8-ton truck in tables 9 and 10 respectively. The calculations assume the delivery service will run 6 days a week (24 days a month) and the truck will travel approximately 70km per day – the TFPM is 30km from Soshanguve South. The rental fees and fuel costs were obtained from Wolff Logistics (Pty) Ltd. The insurance covers the truck, as well as cash and goods in transit valued to R30 000. The staff wages include the daily cost of a driver and a co-driver to assist with purchasing and deliveries. The total daily cost to operate the delivery service with a 4-ton truck is R1335 or 0.33c/kg. The total daily cost to operate the delivery service with an 8-ton truck is R1613.33 or 0.20c/kg.

**Table 9: Cost analysis of 4-ton truck**

Truck cost per month (including maintenance, insurance)	R15 000
Diesel cost per month (70km per day @ R3/km x 24 days)	R5 040
Staff wages per month (R500 per day x 24 days)	R12 000
<b>Total cost per month</b>	<b>R32 040</b>
<b>Total cost per day (24 days)</b>	<b>R 1 335</b>
<b>Total daily cost per kg (4000kg truck)</b>	<b>0.33c</b>

**Table 10: Cost analysis of 8-ton truck**

Truck cost per month (including maintenance, insurance)	R20 000
Diesel cost per month (70km per day @ R4/km x 24 days)	R6 720
Staff wages per month (R500 per day x 24 days)	R12 000
<b>Total cost per month</b>	<b>R38 720</b>
<b>Total cost per day (24 days)</b>	<b>R1 613.33</b>
<b>Total daily cost per kg (8000kg truck)</b>	<b>0.20c</b>

Table 11 shows the Profit/Loss that the SFDS can expect to make for different delivery quantities at a fee of 40c/kg for each truck. The break-even point for the 8-ton truck is 4033.3kg per day, and therefore there is a risk of a loss with the 8-ton truck. However, if demand for the service is high and the truck regularly delivers more than 5000kg of fresh produce to street vendors each day, the

expected profit is high. The break-even point for the 4-ton truck is 3337.5kg, and the maximum profit is R265 per day.

**Table 11: Profit/loss expected per delivery quantity for 8-ton and 4-ton truck**

Delivery Quantity (kg)	Profit/Loss (R)	
	8-ton truck	4-ton truck
0	-1613.33	-1335
1000	-1213.33	-935
2000	-813.33	-535
3000	-413.33	-135
4000	-13.33	265
5000	386.67	
6000	786.67	
7000	1186.67	
8000	1586.67	

The SFDS will give the Street Fresh owner more capital to invest into the business. The service will allow the owner to purchase enough product to meet daily demand, as well as improve the variety of fruits and vegetables sold at the shop. The owner can consider buying higher quality produce from the market while keeping selling prices affordable and competitive.

Table 12 shows that the street vendor using this service can save R50.40 each day. The SFDS will buy in bulk and therefore receive quantity discounts. A quantity discount of R1 for each product is considered in the calculation, but in fact the quantity discounts negotiated with market agents can be more. A profit increase from R141.60 to R192.00 per day would be realised.

**Table 12: Impact of SFDS on daily profit of street vendor**

	Description	R	
<b>Sales</b>			<b>2150.00</b>
	30 x 10kg bag potatoes @ R45.00	1350.00	
	20 x 6kg box of tomatoes @ R40.00	800.00	
<b>Less: Cost of goods sold</b>			<b>(1790.00)</b>
	30 x 10 kg bag potatoes @ R37.00	1110.00	
	20 x 6 kg box tomatoes @ R34.00	680.00	
<b>Less: Transport cost</b>			<b>(168.00)</b>
	Purchase quantity (420kg) @ 40c/kg	168.00	
<b>New Profit</b>			<b>192.00</b>
<b>Old Profit</b>			<b>141.60</b>
<b>Savings</b>			<b>50.40</b>



The profit that street vendors make each day is usually not invested back into their businesses, but instead taken home to support themselves and their families. Increasing their profit provides the opportunity to purchase more stock to meet their daily demands and grow their businesses. On the other hand, decreased costs would allow the vendors to even lower their selling prices to improve the affordability of fresh produce in the community. If the increased capital is not reinvested into their business but spent elsewhere, the local township economy will benefit.

There is a risk of losing money with the SFDS. However, if the SFDS is effectively designed, implemented, and maintained, the benefits that the Street Fresh owner and the street vendors will realise are great. Moreover, the overall food security in the community will improve.

#### **4.7 Define**

The Street Fresh Delivery Service has been selected as the best alternative for supplying the Street Fresh shop. It has been shown how all performance measures of the existing supply chain can be improved. The three main activities of the SFDS are the order system, the purchasing method, and the delivery.

##### **4.7.1 Order system**

Street vendors place their orders at the Street Fresh shop. Orders must be placed before 18:00 for next day delivery. The delivery cost of 40c/kg must be paid to place the order. The street vendor pays for his/her fresh produce when it is delivered to their stall. A minimum quantity of 400kg must be ordered per vendor. The Street Fresh owner sends his/her own order and the individual orders of the street vendors to the SFDS team (driver and co-driver).

##### **4.7.2 Purchasing method**

The SFDS team is ready at the TFPM at 05:00 the following morning with the order. The SFDS uses a registered cash deposit account at the market to purchase stock. The balance of the cash deposit account is enough to ensure the order is fulfilled. The SFDS team negotiates with market agents for quantity discounts on the bulk order. The stock is purchased when the best deals are found, and the truck is loaded with the order. The truck leaves to Soshanguve South at 08:00 latest.

##### **4.7.3 Delivery**

The truck arrives in Soshanguve South at 08:30. The truck stops at each vendor and receives payment for their order. The payment, which is cash, is put into a drop safe in the truck. The street vendors' order is offloaded and the truck then moves on to the next vendor. The SFDS completes all deliveries, including the Street Fresh's delivery, by 10:00.

The truck then returns to the TFPM with all the cash from the various payments. This money is deposited into the SFDSs registered cash deposit account and used for the following morning's purchases. By 11:00, the SFDSs work is complete. This service will be available Monday to Saturday, and each day the processes will be the same. Street vendors that order on Saturday will receive their delivery on Monday.



#### 4.7.4 Solution validation

The main parameter of the supply chain design is that the key performance measures must either be improved or at the very least remain the same. The SFDS improves the key performance measures of availability, affordability, profit margin, procurement time, and overall efficiency for the Street Fresh and for street vendors that use the service. The quality has remained the same.

Transport costs was the only performance measure that has not been improved. The SFDS fee is 40c/kg, which is the same as the highest recorded transport fee at the market. However, the overall cost to the Street Fresh and street vendors has decreased and therefore the measure of transport costs is an exception.

The SFDS is also profitable. Table 13 shows the expected net profit that the SFDS can make in the first year of operation is R138 700. In this calculation, a 4-ton truck is used for the first 3 months of the year, and then when demand increases an 8-ton truck is used for the remaining 9 months. The cost of the drop safe is also included.

**Table 13: Expected gross profit after 12 months**

Item	R
Total income	585 600
Less: Expenses	(446 900)
Wages	144 000
4-ton rent	45 000
4-ton fuel	15 120
8-ton rent	180 000
8-ton fuel	60 480
Safe	2 300
<b>Net Profit before taxes</b>	<b>138 700</b>

This service achieves the aim of the project, which is to efficiently and effectively supply Fresh Produce to the Street Fresh in a low-income community. Overall, the Street Fresh gains a competitive advantage with this service, and the benefit to the local community is great.

#### 4.8 Implementation and maintenance

The SFDS will transport fresh produce from the TFPM to Soshanguve South 6-days a week. The service will also receive payments from vendors and therefore transport cash. To minimize the risk of theft, a drop safe will be built into the truck and a monthly insurance premium paid that covers goods in transit and cash in transit. The truck is insured by Wolff Logistics, and the truck has a tracking device. The maintenance of the truck is also covered by Wolff Logistics and included in the monthly cost. Secure parking must be found near the market when the truck can park overnight, however this location has not been determined.

A 12-month cash budget is presented in table 14. Start-up capital of R65 000 is necessary to implement the SFDS effectively. This capital will be used for start-up costs such as the first

month’s rent of the 4-ton truck (R15 000) and purchasing the drop safe (R2 300). R20 000 will be deposited into the registered cash deposit account at the TFPM and the remaining balance will be working capital. After month 3, an 8-ton truck will replace the 4-ton truck to accommodate the increase in demands for the service. Therefore, the expenses at the end of month 3 include the monthly wages and fuel cost (R17 040) and the first month’s rent of the 8-ton truck (R20 000). In month’s 3,4,6, and 8, more money will be deposited into the SFDSs account at the market.

**Table 14: 12-month cash budget plan**

Month	Opening Balance	Market Balance	Average daily deliveries (kg)	Income	Expenses	Market Balance top - up	Closing Balance
0	R65 000	R0	0	R0	R17 300	R20 000	R27 700
1	R27 700	R20 000	2000	R19 200	R32 040		R14 860
2	R14 860	R20 000	3000	R28 800	R32 040		R11 620
3	R11 620	R20 000	3500	R33 600	R37 040	R5 000	R3 180
4	R3 180	R25 000	4000	R38 400	R38 720	R2 000	R860
5	R860	R27 000	4500	R43 200	R38 720		R5 340
6	R5 340	R27 000	5000	R48 000	R38 720	R8 000	R6 620
7	R6 620	R35 000	5500	R52 800	R38 720		R20 700
8	R20 700	R35 000	6000	R57 600	R38 720	R5 000	R34 580
9	R34 580	R40 000	6500	R62 400	R38 720		R58 260
10	R58 260	R40 000	7000	R67 200	R38 720		R86 740
11	R86 740	R40 000	7000	R67 200	R38 720		R115 220
12	R115 220	R40 000	7000	R67 200	R38 720		R143 700

Street vendors place their orders on credit and are quoted using the daily market prices. This can give rise to two problems; the market prices change the following morning when the order is purchased, and a street vendor cannot pay for his/her order when it is delivered. The following procedures will be used to mitigate these two problems:

Figure 2 is an example of the SFDS daily order sheet. The street fresh owner will input the orders into this sheet and generate a quote using the ‘Current Price’ value which is the purchase prices at the market that morning. A delivery cost is also generated and the vendor will pay this cost to finalize the order. The next morning, when the SFDS team negotiate prices at the market, they will enter the values in the ‘Daily Market Price’ column. This will generate the actual costs of the orders and the difference between the quoted and actual costs. If this difference is greater than R100, the order quantity of the product with the highest increase in price will be reduced until the difference is less than R100. Therefore, the vendors are given a quote that may increase by maximum R100.



Street Fresh Delivery Service Daily Order Sheet								
DATE	Vendor 1	Vendor 2	Vendor 3	Vendor 4	Vendor 5	Total	Quoted Order Cost (R)	Actual Order Cost (R)
Product 1	30					30	1140	1140
Product 2	20					20	700	700
Product 3	10					10	250	250
Product 4	20					20	600	600
Total Quantity (kg)	620	0	0	0	0	620		
Delivery Cost (R)	248	0	0	0	0	248		
Quoted Order Cost (R)	2690	0	0	0	0	2690		
Actual Order Cost (R)	2690	0	0	0	0	2690		
Difference (R)	0	0	0	0	0	0		
	Description	Quantity (kg)	Current Price (R)	Daily Market Price (R)				
Product 1	Potatoes - bag	10	38	38			Delivery Cost	0,4
Product 2	Tomatoes - box	6	35	35				
Product 3	Onions - bag	10	25	25				
Product 4	Apples - box	5	30	30				

Figure 2: SFDS daily order sheet

All goods that cannot be paid for upon delivery will be kept by the SFDS and delivered to the Street Fresh to sell. The delivery costs of these goods are already paid for by the vendor, and thus the goods can be sold at very low selling prices. If there is stock left over at the end of the day, the secure infrastructure of the Street Fresh can be used for overnight storage. Therefore, if a vendor cannot pay for his full order, this can improve the availability and affordability of fresh produce at the Street Fresh, adding to its competitive edge.

There is an opportunity to use the truck when the daily deliveries are complete. Each day at approximately 11:00, the SFDS team will return to the TFPM and deposit the cash received from vendors into the cash deposit account. Thereafter, the SFDS can offer transport services to other buyers at the market. The SFDS can offer the buyers an extremely competitive price of 25c/kg to deliver within a 30km radius of the market. The cost will increase as distance increases from 30km. This will be one of the more affordable transport services available at the market. Therefore, other formal and informal retailers can benefit from this service, and another income stream will be added to the Street Fresh. Furthermore, this extra service can help pay for the daily costs of the truck if the break-even point is not reached. The wages of the SFDS team will increase if this extra service is offered.

It is vital to find the right people for the SFDS team. It is important that the driver and co-driver are from Pretoria and ideally are familiar with Soshanguve. It is also important that they have experience at the TFPM. An option that can be further explored is that the driver and co-driver are given the opportunity to buy into the SFDS business and therefore become important stakeholders. This will ensure that the SFDS is resilient and that the driver and co-driver directly benefit from the profitability of the service.



## **5. Recommendations**

Further research can be done into the use of cashless systems for the SFDS. Establishing direct links between local farmers and entire communities was not a viable solution, but further research must be carried out towards achieving this. Another alternative that can be investigated is establishing a central market in the community where the street vendors can sell their fresh produce and other products. A market could potentially create an economic hub in the community and offer adequate infrastructure to the street vendors, and will make delivery from suppliers more efficient. Finally, the option of re-selling food waste from supermarkets or farms can be further researched.

## **6. Conclusion**

This aim of the project was to address food insecurity in South Africa by improving the availability, affordability, and quality of fresh produce in a low-income and informal communities. This is achieved by designing a supply chain that can efficiently and effectively supply fresh produce to a Street Fresh shop and other street vendors in the community.

The case study in Soshanguve South outlined the problems that street vendors face in procuring and transporting their fresh produce from the Tshwane Fresh Produce Market. The key improvement opportunities for the Street Fresh supply chain that were identified are eliminating the need for the owner to select and purchase stock from the TFPM in person, improving the variety of fruit and vegetables, and increasing profit margin by reducing costs as increasing selling prices is not recommended.

The Street Fresh Delivery Service was selected as the best solution to supply the Street Fresh and other street vendors in the community. The SFDS improves the availability and affordability of fresh produce sold at the Street Fresh, and quality remains the same. This service improves food security in Soshanguve South and gives the Street Fresh a competitive edge to successfully operate in the community. The SFDS can save a street vendor R50 a day and the need to travel to the market every morning, and the service has the potential to make a net profit of R138 700 in its first year of operation.

This solution can be implemented in all low-income informal communities in Gauteng where street vendors sell fresh produce purchased from the TFPM. The solution can meet the needs of informal retailers, improves food security in informal communities, sparks local economic development, and can make money doing it.



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## APPENDIX A

### Department of Industrial & Systems Engineering Final Year Projects

#### Identification and Responsibility of Project Sponsors


All Final Year Projects are published by the University of Pretoria on *UPSpace* and thus freely available on the Internet. These publications portray the quality of education at the University and have the potential of exposing sensitive company information. It is important that both students and company representatives or sponsors are aware of such implications.

#### Key responsibilities of Project Sponsors:

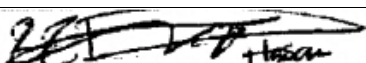
A project sponsor is the key contact person within the company. This person should thus be able to provide the best guidance to the student on the project. The sponsor is also very likely to gain from the success of the project. The project sponsor has the following important responsibilities:

1. Confirm his/her role as project sponsor, duly authorised by the company. Multiple sponsors can be appointed, but this is not advised. The duly completed form will be considered as acceptance of sponsor role.
2. Review and approve the Project Proposal, ensuring that it clearly defines the problem to be investigated by the student and that the project aim, scope, deliverables and approach is acceptable from the company's perspective.
3. Review the Final Project Report (delivered during the second semester), ensuring that information is accurate and that the solution addresses the problems and/or design requirements of the defined project.
4. Acknowledges the intended publication of the Project Report on UP Space.
5. Ensures that any sensitive, confidential information or intellectual property of the company is not disclosed in the Final Project Report.

#### Project Sponsor Details:

<b>Company:</b>	<b>Modular Innobox (Pty) Ltd</b>
<b>Project Description:</b>	<b>Food security in South Africa: Improving the availability, affordability, and quality of fresh produce in spaza shops.</b>
<b>Student Name:</b>	<b>Darren de Beer</b>
<b>Student number:</b>	<b>14045924</b>
<b>Student Signature:</b>	
<b>Sponsor Name:</b>	<b>Hasan Darwish</b>
<b>Designation:</b>	<b>Innovation Director</b>
<b>E-mail:</b>	<b>HDarwish@modular-innovations.com</b>
<b>Tel No:</b>	<b>0182994025</b>
<b>Cell No:</b>	<b>0718971448</b>



<b>Fax No:</b>	N/A
<b>Sponsor Signature:</b>	



Faculty of Engineering,  
Built Environment and  
Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en  
Inligtingtegnologie / Lefapha la Boetšenere,  
Tikologo ya Kago le Theknološhi ya Tshedimošo

Reference number: EBIT/73/2017

2 August 2017

Mr D de Beer  
Department of Industrial and Systems Engineering  
University of Pretoria  
Pretoria  
0028

Dear Mr De Beer,

**FACULTY COMMITTEE FOR RESEARCH ETHICS AND INTEGRITY**

Your recent application to the EBIT Research Ethics Committee refers.

Approval is granted for the application with reference number that appears above.

1. This means that the research project entitled "Food security in South Africa: Improving the availability, affordability and quality of fresh produce in informal communities" has been approved as submitted. It is important to note what approval implies. This is expanded on in the points that follow.
2. This approval does not imply that the researcher, student or lecturer is relieved of any accountability in terms of the Code of Ethics for Scholarly Activities of the University of Pretoria, or the Policy and Procedures for Responsible Research of the University of Pretoria. These documents are available on the website of the EBIT Research Ethics Committee.
3. If action is taken beyond the approved application, approval is withdrawn automatically.
4. According to the regulations, any relevant problem arising from the study or research methodology as well as any amendments or changes, must be brought to the attention of the EBIT Research Ethics Office.
5. The Committee must be notified on completion of the project.

The Committee wishes you every success with the research project.

**Prof JJ Hanekom**

Chair: Faculty Committee for Research Ethics and Integrity  
FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

## APPENDIX B

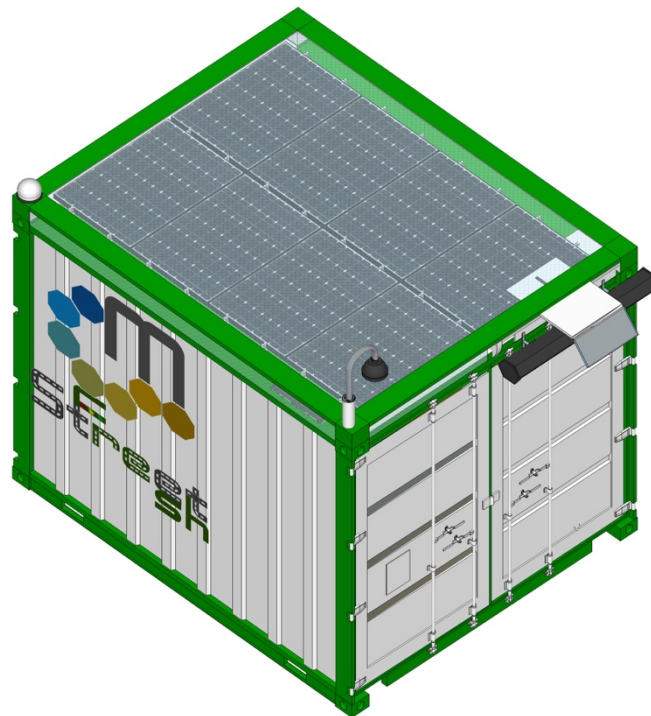


Figure 3: Street Fresh exterior

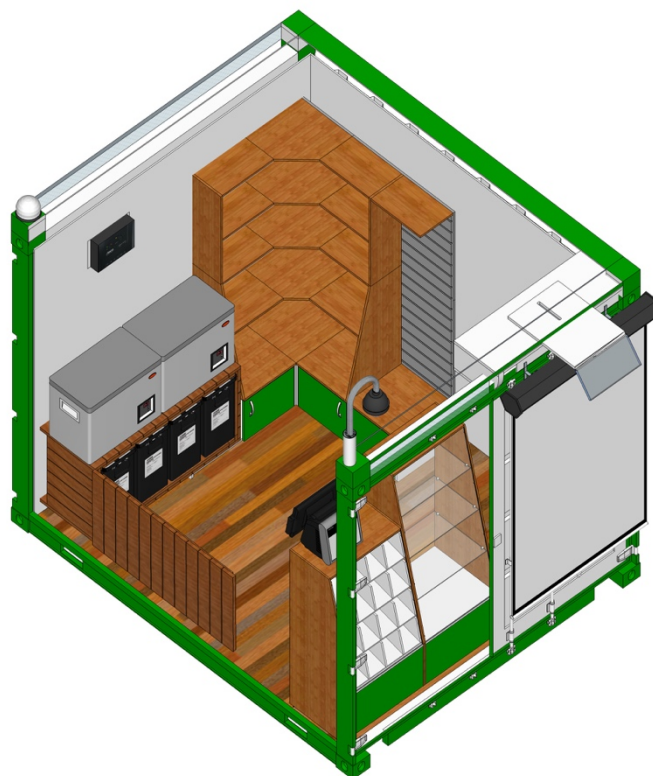


Figure 4: Street Fresh interior

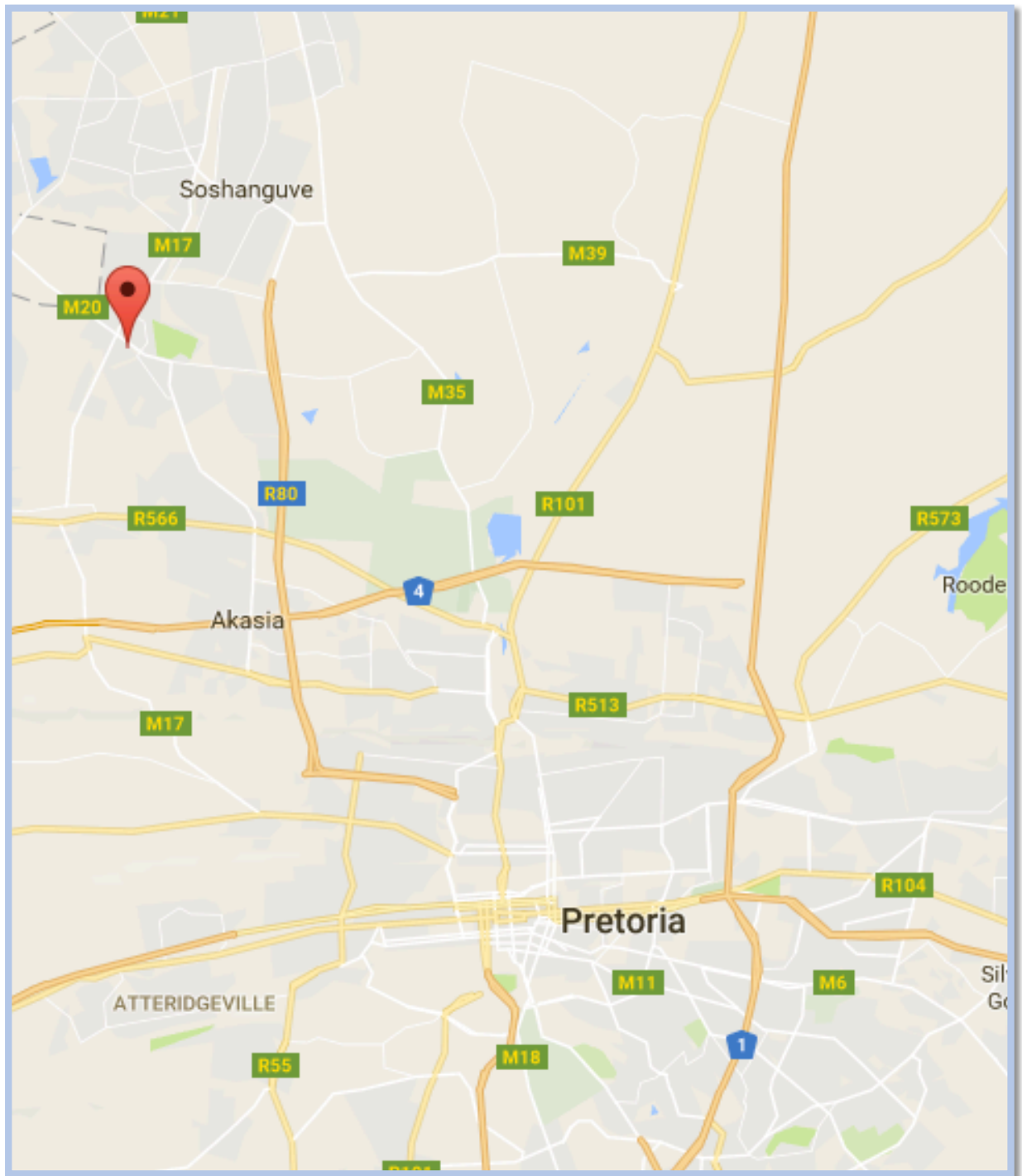


Figure 5: Location of Soshanguve South



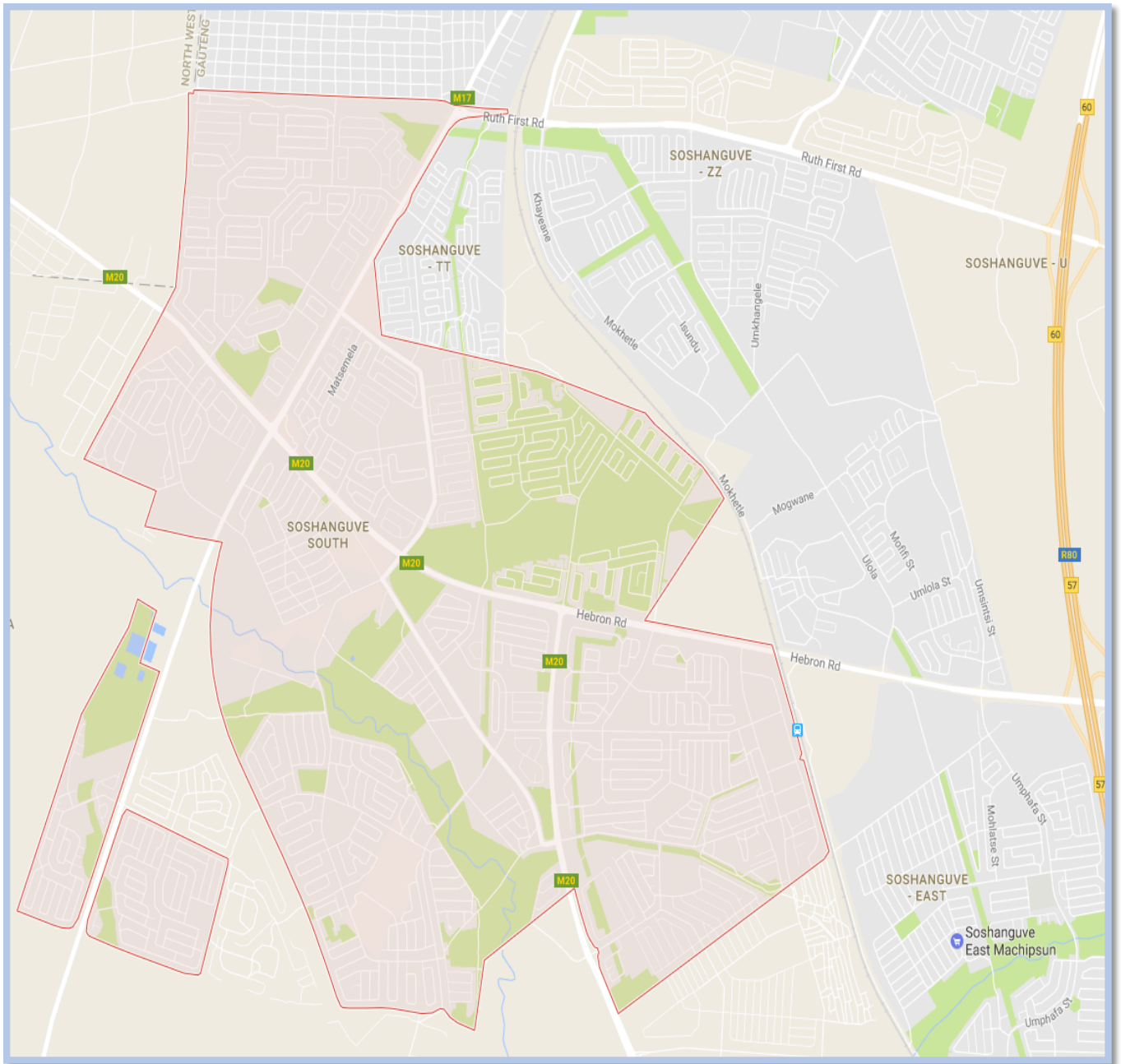


Figure 6: Street map of Soshanguve South





## APPENDIX C

No.	Question
1	<b>Where do you buy your fresh produce from?</b>
2	<b>Where else could you buy fresh produce from?</b> The researcher will ask about buying from farmers, mobile vendors, wholesalers, TFPM etc.
3	<b>What are your main reasons for selecting your supplier?</b> The researcher will focus on cost prices, quality, availability, convenience, location, supplier relationships, discounts, payment methods, group buying schemes, order quantities
4	<b>What is your current process of buying stock?</b> This will include how fresh produce is transported from the suppliers, how the informal retailer travels to and from suppliers (if at all), and how frequently stock is purchased.
5	<b>How much does transport cost you?</b>
6	<b>Are any other means of transport available to you?</b>



7	What products do you most frequently stock and why?
8	How much do these products cost?
9	Are there other products you would like to stock?
10	Do you sell all your stock daily?
11	How much stock do you sell daily?
12	<b>What do you do with your left-over stock?</b> Focus on where and how do you inventory is stored
13	<b>Would you like to increase your order quantities and stock more products?</b> Identify main reasons why/why not



14	<b>When are you the busiest?</b>
15	<b>Who are your customers?</b>
16	<b>How do you determine your selling prices?</b>
18	<b>Would you resell food waste that is still edible from supermarkets/farmers/other?</b>
19	<b>What is your main challenge with buying stock?</b>
20	<b>What would you like to improve in your buying process?</b>